HIGH-OCTANE FUELS AND HIGH-EFFICIENCY VEHICLES: CHALLENGES AND OPPORTUNITIES

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

SECOND SESSION

APRIL 13, 2018

Serial No. 115–118

Printed for the use of the Committee on Energy and Commerce
energycommerce.house.gov

U.S. GOVERNMENT PUBLISHING OFFICE
31–245 PDF WASHINGTON : 2018

COMMITTEE ON ENERGY AND COMMERCE

GREG WALDEN, Oregon
Chairman

JOE BARTON, Texas
Vice Chairman
FRED UPTON, Michigan
JOHN SHIMKUS, Illinois
MICHAEL C. BURGESS, Texas
MARSHA BLACKBURN, Tennessee
STEVE SCALISE, Louisiana
ROBERT E. LATTA, Ohio
CATHY MCMORRIS RODGERS, Washington
GREGG HARPER, Mississippi
LEONARD LANCE, New Jersey
BRETT GUTHRIE, Kentucky
PETE OLSON, Texas
DAVID B. MCKINLEY, West Virginia
ADAM KINZINGER, Illinois
H. MORGAN GRIFFITH, Virginia
GUS M. BILIRAKIS, Florida
BILL JOHNSON, Ohio
BILLY LONG, Missouri
LARRY BUCSHON, Indiana
BILL FLORES, Texas
SUSAN W. BROOKS, Indiana
MARKWAYNE MULLIN, Oklahoma
RICHARD HUDSON, North Carolina
CHRIS COLLINS, New York
KEVIN CRAMER, North Dakota
TIM WALBERG, Michigan
MIMI WALTERS, California
RYAN A. COSTELLO, Pennsylvania
EARL L. "BUDDY" CARTER, Georgia
JEFF DUNCAN, South Carolina

FRANK PALLONE, JR., New Jersey
Ranking Member
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
ELIOT L. ENGEL, New York
GENE GREEN, Texas
DIANA DEGETTE, Colorado
MICHAEL F. DOYLE, Pennsylvania
JANICE D. SCHAKOWSKY, Illinois
G.K. BUTTERFIELD, North Carolina
DORIS O. MATSUI, California
KATHY CASTOR, Florida
JOHN P. SARBANES, Maryland
JERRY MCNERNEY, California
PETER WELCH, Vermont
BEN RAY LUJAN, New Mexico
PAUL TONKO, New York
YVETTE D. CLARKE, New York
DAVID LOEBSACK, Iowa
KURT SCHRADER, Oregon
JOSEPH P. KENNEDY, III, Massachusetts
TONY CÁRDENAS, California
RAUL RUIZ, California
SCOTT H. PETERS, California
DEBBIE DINGELL, Michigan

SUBCOMMITTEE ON ENVIRONMENT

JOHN SHIMKUS, Illinois
Chairman

DAVID B. MCKINLEY, West Virginia
Vice Chairman
JOE BARTON, Texas
MARSHA BLACKBURN, Tennessee
GREGG HARPER, Mississippi
PETE OLSON, Texas
BILL JOHNSON, Ohio
BILL FLORES, Texas
RICHARD HUDSON, North Carolina
KEVIN CRAMER, North Dakota
TIM WALBERG, Michigan
EARL L. "BUDDY" CARTER, Georgia
JEFF DUNCAN, South Carolina
GREG WALDEN, Oregon *(ex officio)*

PAUL TONKO, New York
Ranking Member
RAUL RUIZ, California
SCOTT H. PETERS, California
GENE GREEN, Texas
DIANA DEGETTE, Colorado
JERRY MCNERNEY, California
TONY CÁRDENAS, California
DEBBIE DINGELL, Michigan
DORIS O. MATSUI, California
FRANK PALLONE, JR., New Jersey *(ex officio)*

C O N T E N T S

WITNESSES

SUBMITTED MATERIAL

HIGH–OCTANE FUELS AND HIGH–EFFICIENCY VEHICLES: CHALLENGES AND OPPORTUNITIES

FRIDAY, APRIL 13, 2018

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 9:00 a.m., in room 2123, Rayburn House Office Building, Hon. John Shimkus (chairman of the subcommittee) presiding.

Members present: Representatives Shimkus, McKinley, Barton, Harper, Olson, Johnson, Flores, Hudson, Cramer, Walberg, Carter, Duncan, Walden (ex officio), Tonko, Ruiz, Peters, Green, McNerney, Matsui, Pallone (ex officio).

Also present: Representative Loebsack.

Staff present: Mike Bloomquist, Staff Director; Samantha Bopp, Staff Assistant; Daniel Butler, Staff Assistant; Kelly Collins, Legislative Clerk, Energy/Environment; Jerry Couri, Deputy Chief Counsel, Environment; Wyatt Ellertson, Professional Staff Member, Energy/Environment; Margaret Tucker Fogarty, Staff Assistant; Jordan Haverly, Policy Coordinator, Environment; Ben Lieberman, Senior Counsel, Energy; Mary Martin, Chief Counsel, Energy/Environment; Drew McDowell, Executive Assistant; Brandon Mooney, Deputy Chief Counsel, Energy; Dan Schneider, Press Secretary; Peter Spencer, Senior Professional Staff Member, Energy; Austin Stonebraker, Press Assistant; Hamlin Wade, Special Advisor for External Affairs; Jeff Carroll, Minority Staff Director; Jean Fruci, Minority Policy Advisor, Energy and Environment; Caitlin Haberman, Minority Professional Staff Member; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; Jourdan Lewis, Minority Staff Assistant; Alexander Ratner, Minority Policy Analyst; Tim Robinson, Minority Chief Counsel; Tuley Wright, Minority Energy and Environment Policy Advisor.

Mr. SHIMKUS. I ask all our guests today to please take their seats, and if we can get the doors being closed. Thank you.

The Subcommittee on the Environment will now come to order, and the Chair now recognizes himself for 5 minutes for an opening statement.

OPENING STATEMENT OF HON. JOHN SHIMKUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

This subcommittee has jurisdiction over the EPA programs affecting transportation fuels and vehicles, most significantly the Renewable Fuel Standard, as well as the Corporate Average Fuel Economy/Greenhouse Gas standards.

At our March 7 hearing on the future of fuels and vehicles, we had a chance to learn more about the trends impacting personal transportation in the years ahead. One takeaway was that, although electric vehicles will continue to make inroads, the internal combustion engine will still dominate the market for another three decades or more, as will petroleum and agriculturally based liquid fuels to power these engines. For this reason, the RFS and CAFE/Greenhouse Gas programs will continue to have a significant impact for years to come.

One potential flaw with the RFS and the CAFE/Greenhouse Gas is that the two programs have never been fully coordinated with one another. The RFS doesn't necessarily give us the liquid fuel formulations that maximize energy efficiency, and the CAFE/Greenhouse Gas doesn't necessarily result in the kinds of engines that make the best use of the biofuel blends.

Fortunately, there is new research underway to do better coordinating these programs. At the March hearing, we learned about DOE's Co-Optima initiative that is looking to maximize efficiency by using high-octane fuels and engines specifically designed to run on these fuels. Ideally, this could benefit everyone from corn growers to biofuel producers, refiners, automakers, and most importantly, all consumers.

Today we seek to get the high-octane policy discussion underway in earnest, and I welcome our witnesses.

High-octane fuels can improve fuel economy in engines optimized for them. For automakers, it is also a relatively low-cost tool to increase miles per gallon. And because ethanol is the cheapest source of octane currently available, it also may be a pathway to use at least as much if not more ethanol than under the RFS.

But make no mistake, this is a major undertaking, and I say that respectfully. For one thing, we must deal with the proverbial chicken-and-egg conundrum. We can't expect refiners and gas stations to invest in new fuel unless they know that cars will be manufactured that will run on it. And automakers don't want to commit to new engines until they know that the fuel will be widely available. Significant investment dollars and a great many jobs may be at stake.

And there are a lot of details yet to be decided, including exactly what the high-octane standards should be, how many years refiners and automakers need in order to make the transition, and what gas stations must do in order to provide this new fuel for new vehicles while still carrying the old fuels for existing vehicles.

We also must figure out what other legal and regulatory provisions need to be revised or repealed in order for a high-octane transition to work. And most importantly of all, we need to make sure that what we do is of a net benefit to consumers.

One point I do want to emphasize: This hearing is not a discussion on EPA's midterm evaluation or the CAFE/Greenhouse Gas

standards for model years 2022 through 2025. Regardless of the outcome of that process, we know for certain that fuel economy standards are going to continue increasing from where they are today and that automakers will need every cost-effective option for complying. High octane is one such option and is worthy of serious consideration, and today I hope we can get a constructive dialogue underway.

Thank you.

And I have a minute left. Anyone seek time on the majority side? If not, I would like to recognize the ranking member of the subcommittee, Mr. Tonko, for 5 minutes.

[The prepared statement of Mr. Shimkus follows:]

PREPARED STATEMENT OF HON. JOHN SHIMKUS

This subcommittee has jurisdiction over the EPA programs affecting transportation fuels and vehicles, most significantly the Renewable Fuel Standard as well as the Corporate Average Fuel Economy/Greenhouse Gas (CAFE/GHG) standards.

At our March 7th hearing on the future of fuels and vehicles, we had a chance to learn more about the trends impacting personal transportation in the years ahead. One takeaway was that, although electric vehicles will continue to make inroads, the internal combustion engine will still dominate the market for another three decades or more, as will petroleum and agriculturally based liquid fuels to power these engines. For this reason, the RFS and CAFE/GHG programs will continue to have a significant impact for years to come.

One potential flaw with the RFS and with CAFE/GHG is that the two programs have never been fully coordinated with one another. The RFS doesn't necessarily give us the liquid fuel formulations that maximize energy efficiency, and CAFE/GHG doesn't necessarily result in the kinds of engines that make the best use of biofuel blends.

Fortunately, there is research underway to better coordinate these two programs. At the March hearing, we learned about DOE's Co-Optima initiative that is looking to maximize efficiency by using high-octane fuels and engines specifically designed to run on these fuels. Ideally, this could benefit everyone from corn growers and biofuels producers, refiners, automakers, and most important of all, consumers. Today we seek to get the high-octane policy discussion underway in earnest, and I welcome our witnesses.

High-octane fuels can improve fuel economy in engines optimized for them. For automakers, it is a relatively low cost tool to increase miles per gallon. And because ethanol is the cheapest source of octane currently available, it also may be a pathway to use at least as much if not more ethanol than under the RFS.

But make no mistake—this is a major undertaking. For one thing, we must deal with the proverbial chicken and egg conundrum—we can't expect refiners and gas stations to invest in a new fuel unless they know that cars will be manufactured that will run on it, and automakers don't want to commit to the new engines until they know that the fuel will be widely available. Significant investment dollars and a great many jobs may be at stake.

And there are a lot of details yet to be decided, including exactly what the high-octane standard should be, how many years refiners and automakers need in order to make the transition, and what gas stations must do in order to provide this new fuel for new vehicles while still carrying the old fuels for existing vehicles. We also must figure out what other legal and regulatory provisions need to be revised or repealed in order for a high-octane transition to work. And most important of all, we need to make sure that what we do is of net benefit to consumers.

One point I do want to emphasize—this hearing is not a discussion of EPA's Mid-Term Evaluation of the CAFE/GHG standards for model years 2022 to 2025. Regardless of the outcome of that process, we know for certain that fuel economy standards are going to continue increasing from where they are today, and that automakers will need every cost-effective option for complying. High octane is one such option and is worthy of serious consideration, and today I hope we can get a constructive dialog underway. Thank you.

Mr. SHIMKUS. And I have a minute left. Anyone seek time on the majority side? If not, I would like to recognize the ranking member of the subcommittee, Mr. Tonko, for 5 minutes.

OPENING STATEMENT OF HON. PAUL TONKO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. TONKO. Thank you, Mr. Chair.

And thank you to our witnesses for joining us this morning.

I would like to think all of this subcommittee's hearings are high octane, but none more so than today's——

Mr. SHIMKUS. [Groans.]

Mr. TONKO [continuing]. It's 9 o'clock—which will focus on the challenges and opportunities of high-octane fuels and vehicle efficiency.

Last month, we heard broadly about the future of our Nation's transportation fuels. We learned more about DOE's Co-Optimization program, which is setting how to produce fuels and engines in tandem that will make our vehicles more efficient.

Today's panel represents a cross-section of the transportation sector: refiners, vehicle manufacturers, fuel producers, and retailers. This hearing comes as the administration and some Members of Congress have considered changes to our existing fuels and fuel economy policies.

Earlier this month, EPA Administrator Scott Pruitt determined that emission standards for model year 2022 to 2025 light-duty vehicles should be revised. Personally, I do not believe this decision is justified by the technical record.

Similarly, discussions on how to reform the Renewable Fuel Standard continue. In both cases, we must be mindful of the fact that greenhouse gas pollution from the transportation sector has become our Nation's largest source of emissions and needs to be reduced.

Currently refiners blend additives, most commonly ethanol, into gasoline in order to increase its octane level. A number of today's witnesses will express support for a 95 research octane number—or RON—fuel standard, which would be similar to fuels sold today as premium gasoline and generally cost about 50 cents more than regular unleaded. In theory, the standard would phase in over time.

But before we sign up for an upending policy shift, we need to better understand the consequences of this type of change. Clearly, it would impact all transportation stakeholders, including those represented on the panel, but also, and most importantly, consumers.

During any fuel transition period, I believe it is natural that consumers will gravitate toward the cheapest fuel option, as they have always done. It is critical to consider how consumers will deal with any potential fuel cost increase or confusion around misfueling.

The other issue to consider is how an octane standard would interact with or displace the RFS. Obviously, there are a wide variety of views on the RFS. I believe in some ways it has been successful in achieving its stated goals and in others it has fallen short, particularly around the development of advanced biofuels production.

In that case, the question that I will find most important is, Will moving to a high-octane fuel standard do a better job in incentivizing and creating market signals for advanced biofuels? I think probably not, but I am open to hearing otherwise.

One success of the RFS has been the reduction in carbon pollution. The RFS supports fuels that are less carbon intensive than gasoline. But unless there are certain requirements, it is my understanding that a 95 RON fuel would not necessarily be guaranteed to use ethanol or other low-carbon biofuels and could potentially increase the carbon intensity of our Nation's fuel supply.

We should consider how best to ensure a transition to higher octane fuels does not permit a backslide on the gains that have already been made to improve air quality and reduce carbon emissions.

Similarly, how would this standard interact with CAFE standards? There is potential for higher octane fuels, coupled with turbocharged engines, to help achieve fuel economy standards. But I don't think this can or should be done without the certainty that these standards will continue and continue to be strengthened into the future.

I don't agree that our Nation's existing fuels and fuel economy programs are as problematic as some here. But I am sure these programs can be improved, and I am open to hearing ideas that seek to further the goals of these programs without eroding the progress that has already been made.

Once again, I want to thank our witnesses for joining us this morning. I look forward to hearing your testimony.

Mr. Chair, again, thanks for the hearing, and I yield back.

[The prepared statement of Mr. Tonko follows:]

PREPARED STATEMENT OF HON. PAUL TONKO

Thank you, Chairman Shimkus. And thank you to our witnesses for joining us this morning.

I like to think all of this subcommittee's hearings are high octane. But none more so than today's, which will focus on the challenges and opportunities of high-octane fuels and vehicle efficiency.

Last month, we heard broadly about the future of our Nation's transportation fuels. We learned more about DOE's co-optimization program, which is studying how to produce fuels and engines in tandem that will make our vehicles more efficient.

Today's panel represents a cross section of the transportation sector- refiners, vehicle manufacturers, fuel producers, and retailers.

This hearing comes as the administration and some Members of Congress have considered changes to our existing fuels and fuel economy policies.

Earlier this month, EPA Administrator Scott Pruitt determined that emissions standards for Model Year 2022–2025 light-duty vehicles should be revised. Personally, I do not believe this decision is justified by the technical record.

Similarly, discussions of how to reform the Renewable Fuel Standard continue.

In both cases, we must be mindful of the fact that greenhouse gas pollution from the transportation sector has become our Nation's largest source of emissions and needs to be reduced.

Currently, refiners blend additives, most commonly ethanol, into gasoline in order to increase its octane level.

A number of today's witnesses will express support for a 95 Research Octane Number, or RON, fuel standard, which would be similar to fuels sold today as premium gasoline and generally cost about 50 cents per gallon more than regular unleaded.

In theory, this standard would phase-in over time.

But before we sign up for an upending policy shift, we need to better understand the consequences of this type of change.

Clearly it would impact all transportation stakeholders- including those represented on the panel, but also, and most importantly, consumers.

During any fuel transition period, I believe it is natural that consumers will gravitate to the cheapest fuel option, as they have always done.

It is critical to consider how consumers will deal with any potential fuel cost increase or confusion around misfueling.

The other issue to consider is how an octane standard would interact with or displace the RFS.

Obviously, there are a wide variety of views on the RFS. I believe in some ways it has been successful in achieving its stated goals, and in others it has fallen short, particularly around the development of advanced biofuels production.

In that case, the question I find most important is, "Will moving to a high-octane fuel standard do a better job in incentivizing and creating market signals for advanced biofuels?" I think probably not, but I am open to hearing otherwise.

One success of the RFS has been the reduction in carbon pollution.

The RFS supports fuels that are less carbon intensive than gasoline. But unless there are certain requirements, it is my understanding that a 95 RON fuel would not necessarily be guaranteed to use ethanol or other low-carbon biofuels, and could potentially increase the carbon intensity of the Nation's fuel supply.

We should consider how best to ensure a transition to higher octane fuels does not permit a backslide on the gains that have already been made to improve air quality and reduce carbon emissions.

Similarly, how would this standard interact with CAFE standards?

There is potential for higher octane fuels, coupled with turbocharged engines, to help achieve fuel economy standards.

But I don't think this can or should be done without the certainty that these standards will continue, and continue to be strengthened, into the future.

I don't agree that our Nation's existing fuels and fuel economy programs are as problematic as some here.

But I am sure these programs can be improved, and I am open to hearing ideas that seek to further the goals of these programs without eroding the progress that has already been made.

Once again, I want to thank our witnesses for joining us this morning. I look forward to hearing your testimony. And I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the chairman of the full committee, Chairman Walden, for 5 minutes.

OPENING STATEMENT OF HON. GREG WALDEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Mr. WALDEN. Thank you, Mr. Chairman.

And I want to welcome our witnesses for being here and all those who have been so engaged in this issue.

The Energy and Commerce Committee takes our obligation seriously to get the fuels and vehicles policy right. It is about time.

A vehicle and the gas it runs on is a major expense for households, as well as millions of small businesses, farms, and ranches. And the many companies that produce and sell fuels and vehicles employ millions of Americans, as we all know, and range in size from major automakers and refiners to small companies like Red Rock Biofuels, which is looking to help reduce the risk of wildfire in our forests by converting woody biomass into biofuel and jobs for the rural areas in my district in Lakeview, Oregon.

But getting the policy right isn't always easy—I think we would all admit to that here—especially with complex and sometimes contentious issues like the Renewable Fuel Standard and vehicle fuel economy standards.

Today we explore an idea to facilitate compliance with the RFS while also improving fuel economy. By transitioning to higher octane blends and vehicles whose engines are designed to maximize efficiency from those fuels, we could both incorporate more ethanol into fuel supply while also increasing miles per gallon.

At first look, it seems like an elegant way to make both the RFS and CAFE standards work better together. Of course, whenever something sounds too good to be true, it very well may be, so we need to kick the proverbial tires of this policy idea before moving ahead, and that is the purpose of today's hearing.

We need to be especially mindful of the consumer impacts. We want a policy outcome that brings down the cost of driving, so questions about the impact on the price per gallon at the pump and on sticker price of new vehicles will need to be addressed, as well, as will questions whether this is the most cost-effective means to improve fuel economy and to reduce emissions.

But while looking at these concerns, we also need to consider the upside potential of high-octane fuels and vehicles. I look forward to the discussion today. And I would just thank the chairman of the subcommittee and others who are putting their shoulder to the wheel here.

This is a priority for me. It is a priority for this committee. It is a priority for the country. And we intend to move forward one way or another. So we appreciate that you all take that seriously as we do, and we look forward to having everybody at the table and working this out this year.

With that, I would yield back to the chairman of the subcommittee.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

The Energy and Commerce Committee takes our obligation seriously to get fuels and vehicles policy right. A vehicle and the gas it runs on is a major expense for households as well as millions of small businesses, farms, and ranches. And the many companies that produce and sell fuels and vehicles employ millions of Americans and range in size from major automakers and refiners to smaller companies like Red Rock Biofuels, which is looking to help reduce the risk of wildfire in our forests by converting woody biomass into biofuel and jobs for the rural community of Lakeview, Oregon.

But getting the policy right isn't always easy, especially with complex and sometimes contentious issues like the Renewable Fuel Standard and vehicle fuel economy standards.

Today, we explore an idea to facilitate compliance with the RFS while also improving fuel economy. By transitioning to higher octane blends and vehicles whose engines are designed to maximize efficiency from those fuels, we could both incorporate more ethanol into the fuel supply while also increasing miles per gallon.

At first look, it seems like an elegant way to make both the RFS and CAFE standards work better together. Of course, whenever something sounds too good to be true, it very well may be, so we need to kick the proverbial tires of this policy idea before moving ahead. That is the purpose of today's hearing.

And we need to be especially mindful of the consumer impacts. We want a policy outcome that brings down the cost of driving. So questions about the impact on the price per gallon at the pump and on the sticker price of new vehicles will need to be addressed, as will questions whether this is the most cost-effective means to improve fuel economy and reduce emissions.

But while looking at these concerns, we also need to consider the upside potential of high-octane fuels and vehicles. I look forward to today's serious discussion of this concept.

Mr. SHIMKUS. The gentleman yields back the time.

The Chair now recognizes the ranking member of the full committee, Congressman Pallone, for 5 minutes.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman.

Some will say that establishing a high-octane fuel standard can serve as an alternative to the current Renewable Fuel Standard, or RFS, program. But others have very different viewpoints. Today we will hear both sides and review whether moving to a high-octane standard can satisfy enough stakeholders to move forward with RFS reform legislation. I remain skeptical.

As with any policy, the devil is in the details, and here are just a few of my questions. First, at what octane level would we set the standard? Second, is it a performance standard only, or would we retain some discretion to designate clean and renewable fuels as a source for that octane? And third, where would advanced and cellulosic biofuels fit into this new program? Fourth, what engine modifications are necessary, and how quickly can they be integrated into new vehicle models? And fifth, how would consumers be affected? And last, how will this affect workers in the refining, automotive, and agricultural sectors?

These answers make a big difference about how stakeholder groups will be impacted. Unfortunately, today's panel does not come close to representing everyone involved.

Congress enacted the RFS program to diversify the fuel supply, reduce dependence on fossil fuels, promote rural development, and deliver environmental benefits. While it achieved many of these goals, especially in air quality, the record on environmental benefits of the RFS is mixed. High-octane fuel standards may or may not deliver environmental benefits in terms of air quality, greenhouse gas emissions, and resource use.

This is critical, particularly in light of last week's announcement by EPA Administrator Scott Pruitt that the Trump administration was going to roll back fuel efficiency standards for passenger vehicles and light-duty trucks. Continued growth of greenhouse gas emissions in the transportation sector must stop, and fuel economy must improve dramatically.

A policy change that extends the dominance of fossil fuel use in transportation, that slows improvement in vehicle fuel economic standards, or keeps us on the path of increased carbon emissions in the transportation sector is unacceptable, in my opinion.

And the current RFS program is not perfect. In the past few days, we learned that this administration's implementation of the RFS is far from perfect. I have serious concerns and questions about Administrator Pruitt's extensive use of secret waivers to allow numerous refineries, apparently of all shapes and sizes, to get out from their obligations under the law.

I support the judicious use of waivers as appropriate under law to relieve the burden on small refiners facing real hardship. However, these secret waivers by Administrator Pruitt seem to have gone far beyond the scope of the law to include refineries that are

neither small nor in financial distress, and that is absolutely not the way to address problems with RFS implementation.

We must evaluate this proposal for changes to the RFS program against its successes and shortcomings. The RFS has encouraged a great deal of investment by companies and individuals throughout the entire transportation, agricultural, and biotechnology sectors.

Without careful consideration and analysis, we risk severe disruption and hardship for businesses, farmers, workers, consumers, and the environment, and trading one set of problems for another is simply not progress.

So I know this is going to be a valuable hearing. And I thank you, Mr. Chairman and our ranking member for doing this today. Thank you.

[The prepared statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

Some will say that establishing a high-octane fuel standard could serve as an alternative to the current Renewable Fuel Standard (RFS) program. Others have very different viewpoints. Today we will hear both sides and review whether moving to a high-octane standard can satisfy enough stakeholders to move forward with RFS reform legislation. I remain skeptical.

As with any policy, the devil is in the details. Here are just a few of my questions:

- At what octane level would we set the standard?
- Is it a performance standard only or would we retain some discretion to designate clean and renewable fuels as the source for that octane?
- Where would advanced and cellulosic biofuels fit into this new program?
- What engine modifications are necessary and how quickly can they be integrated into new vehicle models?
- How would consumers be effected?
- How will this affect workers in the refining, automotive, and agricultural sectors?

These answers make a big difference about how stakeholder groups will be impacted. Unfortunately, today's panel does not come close to representing everyone involved.

Congress enacted the RFS program to diversify the fuel supply, reduce dependence on fossil fuels, promote rural development and deliver environmental benefits. While it achieved many of these goals, especially in air quality, the record on environmental benefits of the RFS is mixed. High-octane fuel standards may or may not deliver environmental benefits in terms of air quality, greenhouse gas emissions, and resource use.

This is critical, particularly in light of last week's announcement by EPA Administrator Scott Pruitt that the Trump administration was going to roll back fuel efficiency standards for passenger vehicles and light duty trucks. Continued growth of greenhouse gas emissions in the transportation sector must stop, and fuel economy must improve dramatically. A policy change that extends the dominance of fossil fuel use in transportation, that slows improvement in vehicle fuel economy standards, or keeps us on a path of increased carbon emissions in the transportation sector is unacceptable.

The current RFS program is not perfect. And, in the past few days, we've learned that this administration's implementation of the RFS is far from perfect.

I have serious concerns and questions about Administrator Pruitt's extensive use of secret waivers to allow numerous refineries—apparently of all shapes and sizes—to get out from their obligations under the law. I support the judicious use of waivers as appropriate under law to relieve the burden on small refiners facing real hardship. However, these secret waivers by Administrator Pruitt seem to have gone far beyond the scope of the law to include refineries that are neither small nor in financial distress. That is absolutely not the way to address problems with RFS implementation.

We must evaluate this proposal for changes to the RFS program against its successes and shortcomings. The RFS has encouraged a great deal of investment by companies and individuals throughout the entire transportation, agricultural, and biotechnology sectors.

Without careful consideration and analysis, we risk severe disruption and hardship for businesses, farmers, workers, consumers, and the environment. Trading one set of problems for another is not progress.

Thank you, I yield back.

Mr. SHIMKUS. I thank the gentleman.

We now conclude with Members' opening statements. The Chair would like to remind Members that, pursuant to committee rules, all Members' openings statements will be made part of the record.

We want to thank all of our witnesses for being here today and taking the time to testify before the subcommittee. Today's witnesses will have the opportunity to give opening statements followed by a round of questions from Members. So we will just begin.

First, I would like to recognize Mr. Timothy Columbus, general counsel, Society of Gasoline Marketers of America and the National Association of Convenience Stores.

Sir, you have 5 minutes. Your full testimony is in the record, and you are now recognized.

STATEMENTS OF R. TIMOTHY COLUMBUS, COUNSEL, NATIONAL ASSOCIATION OF CONVENIENCE STORES AND SOCIETY OF INDEPENDENT GASOLINE MARKETERS OF AMERICA; EMILY SKOR, CHIEF EXECUTIVE OFFICER, GROWTH ENERGY; DAN NICHOLSON, VICE PRESIDENT OF GLOBAL PROPULSION SYSTEMS, GENERAL MOTORS, ON BEHALF OF THE UNITED STATES COUNCIL FOR AUTOMOTIVE RESEARCH; PAUL JESCHKE, CHAIRMAN, ILLINOIS CORN GROWERS ASSOCIATION; AND CHET THOMPSON, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN FUEL & PETROCHEMICAL MANUFACTURERS

STATEMENT OF R. TIMOTHY COLUMBUS

Mr. COLUMBUS. Thank you, Mr. Chairman. My name is Tim Columbus. I am from the law firm of Steptoe & Johnson. I appear today on behalf of our clients, the National Association of Convenience Stores and the Society of Independent Gasoline Marketers of America. These associations represent over 80 percent of retail fuel sales in the United States.

As a result of—as Mr. Tonko knows, my favorite term is "the big stupid price signs"—that market is the most transparent and price competitive commodities market on the face of the earth.

Simply stated, retailers want to sell products in a legal way to people who want to buy them. They don't buy them because we sell them. We sell them because they want them.

Because they do not manufacture the products they sell, they favor, as do all buyers, deep, diverse markets behind them from which they can obtain supplies. And in that context I should comment that the RFS has, in fact, diversified the market from which our members purchase product.

As I told Chairman Shimkus and Ranking Member Tonko at their first roundtable on this issue, retailers seek peace in the valley. We believe that the concept that is being proposed today offers, perhaps, a path to achieve that objective.

Implementing a program in which all new cars would be required to run on higher octane fuels, fundamentally a performance standard, would have the following salutary effects, in our opinion.

Number one, consumers would benefit from, A, higher mileage, and B, that the costs of fuels would be driven down based on the economic advantage of their component parts. Today the cheapest octane on earth is, in fact, ethanol. I believe this opens a substantial opportunity for ethanol and that that can, in fact, lower the cost of motor fuels overall.

Number two, the environment would benefit from decreased auto emissions. High-compression engines are more efficient, we get better mileage, and we spew less stuff into the air. It is a technical term, "stuff."

Fuel marketers would benefit from a continued and evolving diversity in supply, which will drive down their costs and, therefore, the costs of their customers. I believe fuels' manufacturers would benefit from their increased ability to supply products which are marketed based on their economic efficiencies in relevant markets, rather than based on a formulaic approach.

For retailer marketers in particular, the specific benefits of this approach, I think, are the following. The change in the product mix would occur over time. That results in, at least at the outset, minimal if any need to modify existing infrastructure. RON 95 is in the market today, and it is available at virtually every retail outlet in the United States.

By assuring an ever-increasing market for those new fuels, marketers will be in a position to make a decision to invest knowing that there is a guaranteed demand for the product that requires the investment and that they will be able to achieve an economic return.

By opening the market to new fuels and properly allocating responsibility for compliance amongst manufacturers, marketers, and consumers, retailers will have the option of introducing new fuels to the market to meet consumers' demand for those fuels.

In conclusion, NACS and SIGMA believe the concept being discussed today offers all the stakeholders in this debate the benefit of going forward based on a performance rather than a formulaic standard.

I have been around some of you for a while. It has been my experience that, when manufacturers face a performance standard, it is the instance in which the great American competitive genius has produced the best economic results for the consumers and all of us who serve them.

We congratulate the subcommittee for holding this hearing. We urge you to move forward in an effort to alleviate the ongoing plague of industry squabbles and enhance the interests of fuel consumers in obtaining the most cost-effective fuels for their vehicles.

Thank you. I am happy to answer any questions that these comments or my statement may have raised for you.

[The prepared statement of Mr. Columbus follows:]

Statement of

R. Timothy Columbus

Counsel to the

National Association of Convenience Stores (NACS)

and

Society of Independent Gasoline Marketers of America (SIGMA)

Before the

U.S. House Committee on Energy and Commerce,

Subcommittee on Environment

April 13, 2018

Hearing on

"High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities."

I. SUMMARY OF TESTIMONY

- With the 2022 sunset of statutorily mandated blending targets under the Renewable Fuel Standard ("RFS") Program, fuels industry stakeholders must consider the future of the program post-2022.

- NACS and SIGMA consider an "octane solution," which will require automobiles to be built to use fuel with a minimum of 95 Research Octane Number ("RON") after a date to be determined (presumably post-2022), to be a viable option to consider as part of RFS reform. Given those automobiles' need to run on 95 RON fuel, this solution would spur demand for 95 RON fuel, which is already being sold in the marketplace today. Such a plan should be phased in gradually and maintain a strong market for renewable fuels such as ethanol and biodiesel. This is achievable even if it includes gradual off-ramps for RFS mandates.

- The octane solution would put the United States on a world standard and incentivize higher efficiency engines, which can improve gas mileage and limit emissions. It would provide a pathway for auto manufacturers to meet fuel economy standards, provide fuel blend flexibility to retailers and refineries, and provide market opportunity for renewable fuels producers.

- To achieve the environmental benefits of the octane solution, however, automobiles manufactured after a certain date would need higher octane fuels. In order for the plan to be successful, therefore, retailers will need misfueling liability protections; national standardization of signage; and a 1 lb. waiver for fuels with a Reid Vapor Pressure ("RVP") of less than or equal to E10, among other regulatory changes.

II. INTRODUCTION

Chairman Shimkus, Ranking Member Tonko, and members of the Subcommittee, thank you for the opportunity to testify on the challenges and opportunities related to high octane fuel. My name is Tim Columbus, and I am speaking today on behalf of the National Association of Convenience Stores ("NACS")[1] and the Society of Independent Gasoline Marketers of America ("SIGMA")[2] (collectively the "Associations").[3] The Associations represent those who sell the preponderance of motor fuels at retail in the United States.

The Associations' members are effective surrogates for consumers. In the U.S., gasoline purchases account for about five percent of all consumer spending in a year. Retailers' competition for market share, along with certain market pricing realities, have made the U.S. fuels market one of the most competitive and transparent markets in the country. It is not unusual to see price swings throughout the day as gas stations adjust to market fluctuations. Consumers will often change where they buy gas to save just a few cents per gallon.[4]

As Congress, the Administration, and relevant industry stakeholders continue to debate the future of liquid fuels, I am pleased to provide fuel retailers' and marketers' perspectives.

A. Background on the Fuel Retailing and Convenience Industry

In 2016, the fuel wholesaling and convenience industry employed more than 2.7 million workers and generated $549.9 billion in total sales, representing approximately 3 percent of U.S. Gross Domestic

[1] NACS is an international trade association representing the convenience store industry with more than 2,100 retailer and 1,750 supplier members, the majority of whom are based in the United States.

[2] SIGMA represents a diverse membership of approximately 260 independent chain retailers and marketers of motor fuel.

[3] Mr. Columbus is counsel to NACS and SIGMA.

[4] According to a 2017 NACS survey, 67% of consumers say they would drive five minutes out of their way to save 5 cents per gallon and 61% say that price is the most important factor in determining where they buy gas. See *How Consumers Behave at the Pump,* NACS, http://www.convenience.org/YourBusiness/FuelsCenter/Pages/How-Consumers-Behave-at-the-Pump.aspx#.Ws4QQS7wbb0.

Product. Of those sales, approximately $317 billion came from fuel sales alone. Because of the number of fuel and other transactions in which the industry engages, fuel retailers and marketers handle approximately one of every 30 dollars spent in the United States. Fuel retailers serve about 160 million people per day—around half of the U.S. population—and the industry processes over 73 billion payment transactions per year. Nevertheless, the convenience store and fuel retail industry is truly an industry of small businesses. Approximately 63 percent of convenience store owners operate a single store.

The fuel wholesaling and convenience store market is one of the most competitive in the United States. Fuel retailers operate on tiny margins and are unable to absorb incremental cost increases without passing them on to consumers. Today, there are approximately 150,000 retail fueling facilities throughout the nation. The majority are owned by independent companies, whether single-store operators or regional chains, and each of these businesses have different approaches to how they buy and sell fuel. Less than 5 percent are owned and operated by the integrated oil companies.

III. BACKGROUND ON THE RFS

First established by Congress in 2005 and then substantially expanded in 2007,[5] the RFS is intended to: (1) enhance the energy security and independence of the United States by displacing petroleum products from unstable sources with renewable fuels, and (2) increase the use of renewable fuels that have more favorable emissions characteristics than traditional petroleum-based products.

To accomplish its objectives, the RFS calls for the introduction and blending of an increasing amount of biofuels into the nation's fuel supply, culminating in the use of 36 billion gallons of renewable fuels by 2022. Specifically, through 2022, the RFS establishes four annual renewable volume

[5] Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005); Energy Independence and Security Act, Pub. L. No. 110-140, 121 Stat. 1492 (2007).

obligations ("RVOs"), which specify the volumes of certain renewable fuels that must be blended each year into the nation's transportation fuel supply. The four renewable fuel categories are: (1) cellulosic biofuel, (2) biomass-based diesel, (3) advanced biofuel, and (4) total renewable fuel. While "conventional" biofuels (generally, corn-based ethanol) do not have a specific mandate under the Program, the category generally makes up the difference between total renewable fuels and advanced biofuels. Conventional biofuel RVOs are, however, capped at a maximum of 15.0 billion gallons for each year after 2015.

The program has, to a large extent, achieved its objectives and broadened the domestic fuels market. Furthermore, retailers—whose sole objective is to sell legal products, in a lawful way, to customers who want to buy them—have embraced the program and worked in a flexible way with EPA and other stakeholders to ensure the program's functionality for more than a decade.

It is important to note, however, that the program has seen controversy since its creation in 2005. There have been a number of debates over the past decade as to how the RFS should be implemented. Throughout these policy discussions, retailers' primary objectives have been ensuring stable, efficient, diverse markets that set the stage for an environment where consumers have a variety of cost-effective options from which to choose, and businesses that make investments based on the RFS's incentives are rewarded rather than punished.

For example, the Associations supported the Environmental Protection Agency ("EPA" or "the Agency") exercising its statutory "waiver authority" to lower RVOs below statutory levels in order to avoid breaching the "blend wall" (the point at which there are insufficient Renewable Identification Numbers ("RINs") to fulfill obligated parties' RVOs), and the dramatic market disruption and rise in fuel prices that would result. The Associations also opposed shifting the "point of obligation"

downstream from importers and refiners to "position holders" at the terminal rack, as this would have discouraged marketers from incorporating renewable fuels into their supply, punished businesses that responded to congressional incentives, and led to higher fuel prices.

As we approach 2022, the year when the statutorily mandated blending requirements end and full control over setting RVOs will be given to EPA, it is important to consider what changes should be made to the program. In looking for a way to handle the RFS post-2022, Congress must take into account both the program's successes—as well as its shortfalls—to ensure that any solution successfully shapes the future of the liquid transportation fuels market in the U.S.

IV. RFS & OCTANE

As Congress moves forward with RFS reform, the Associations encourage lawmakers to examine higher octane fuel as a possible avenue to address competing interests in the fuels sphere because of its benefits for fuel efficiency. Octane is a measure of the maximum compression that can be handled by a fuel before it ignites; in other words, it is the measure of a particular fuel's ability to resist premature ignition (also known as "knocking"). A higher octane measure generally correlates with a lower risk of knocking, and when the risk of premature ignition is lower, possible engine damage from the phenomenon is minimized. This is why higher compression engines, which can improve both fuel efficiency and car performance, generally require higher octane fuels.

As we approach the 2022 RFS sunset, it is worth considering: what can be done to improve fuel efficiency, enhance emissions benefits, and reduce volatility in the fuels market? Establishing a standard for newly manufactured automobiles (after a certain model year) that requires them to run on a minimum octane of 95 Research Octane Number (RON) may be part of the answer.[6] This is comparable

[6] As the National Renewable Energy Laboratory notes, "For modern technology engines, RON is the better measure of performance (knock prevention)" compared to the current way of calculating octane (RON+MON/2). Moving to a RON

to about 91-92 octane under the current U.S. octane rating system, which is already available today to consumers.[7] (Further discussion on why the standard should be 95 RON is found below in subsection IV.A)

The use of 95 RON would be a floor, not a ceiling, meaning that retailers could still offer premium fuels with a higher octane rating to consumers if the market demands it (which the Associations fully expect it will). *It is also important to note that transitioning new cars to a higher octane fuel would not mean that all cars in the United States would be required to use 95 RON fuel.* Rather, *only* cars manufactured after a certain model year (to be determined) would be required to run on a minimum octane of 95 RON. Thus, all other cars would be able to continue using what is sold today as 87 octane regular fuel.

Critically, the new cars would require the motor fuels market to meet a performance standard – there would not be a formulaic mandate for fuels. This would ensure that market dynamics would influence how businesses, which would respond to consumer demand for particular types of fuel, choose what fuel components to blend to produce gasoline at retail that would meet the standard. By establishing a performance standard for automobiles as opposed to a fuel formula, the government would not be mandating a particular fuel blend solution, but would instead allow the market to find the most cost effective solutions—and as history has shown, that will likely lead to a much better result both for the businesses involved with the technology and U.S. consumers.

To move away efficiently from the current regime, the Associations support a phase-in of the performance specifications. This would allow time to provide responsible off-ramps for the existing

---

regime would also place the U.S. on a standard consistent with the standard used in other parts of the world (e.g., Europe). *See infra* note 8.

[7] The current rating system calculates octane ratings by using an average of RON and the Motor Octane Number (MON). RON tests fuel performance in an engine with variable compression levels, while MON uses a similar engine, but tests under more severe conditions, such as higher speeds. The U.S. lists fuel on pumps using a formula for the average of: (RON + MON)/2, also known as Anti-Knock Index (AKI).

renewable fuel mandates, while still maintaining a market for these fuels. Ethanol has long been used as a high-octane fuel component, and as such, would ostensibly be guaranteed market share as an oxygenate under the proposal. Indeed, done properly, the phase-*down* of the RFS mandates for corn ethanol would correspond to the phase-*in* of vehicles that must run on higher octane fuels.

Implementation of the new regime would allow retailers to work within a market governed by free market principles. Given the close relationships that fuel retailers have with consumers, the regime will see smoother implementation into the marketplace with retailers on board.

A. BENEFITS OF OCTANE

As lawmakers consider a post-2022 pathway for the RFS program, the benefits of an octane solution are appealing. First, an octane solution would not overwhelm or necessitate an overhaul of the fuels system. Rather, it is a solution that builds on the existing system and would not require drastic infrastructure or other changes for existing stakeholders to adopt the standard. For instance, 95 RON is comparable to about 91-92 octane under the current U.S. octane rating system, which means 95 RON is *already* a product that is sold at retail to consumers and supported by the fuels supply chain.

Second, moving to a 95 RON standard, while it will necessitate changes to labeling and consumer education, nonetheless brings certain benefits and efficiencies to the system. As the National Renewable Energy Laboratory notes, "For modern technology engines, RON is the better measure of performance (knock prevention)" compared to the current way of calculating octane (RON+MON/2).[8] Moving to a RON regime would also place the U.S. on a standard consistent with the standard used in other parts of the world (e.g., Europe). Inter-market uniformity enhances overall market efficiencies, a net benefit.

---

[8] McCormick, Robert. (March 17, 2016). *High Octane Fuels: Benefits and Challenges*. Presentation. *Available at* https://cleancities.energy.gov/files/u/news_events/document/document_url/158/CC_HOF_Webinar_Combined.pdf.

Third, implementing a national octane standard would further support automakers' efforts to reduce emissions via the use of higher efficiency engines that can run on high octane fuel. Engines that run more efficiently can improve automobile performance and gas mileage, and result in positive environmental benefits by reducing emissions.[9] With regard to a floor of 95 RON, fuels and auto industry stakeholders have said that between 94 RON and 96 RON is where "the cost to reduce emissions and improve efficiency is lowest for both automotive and fuel manufacturers."[10] Automakers have generally delivered on fuel economy standards by developing technologies to improve the fuel efficiencies of cars. However, another way to help meet the standards is to adjust the fuels used by the nation's current transportation fleet.

Using an octane specification as opposed to an octane formula also allows the market to tailor blendstocks to create desired fuel mixes. The benefits of such flexibility are discussed in greater detail below.[11] There may also be other benefits that other industry sectors (*i.e.*, automakers) find particularly appealing.

V. OCTANE & RETAIL

[9] Economic and Environmental Benefits of Higher-Octane Gasoline. Raymond L. Speth, Eric W. Chow, Robert Malina, Steven R. H. Barrett, John B. Heywood, and William H. Green. *Environmental Science & Technology,* 2014, *48* (12), 6561-6568, DOI: 10.1021/es405557p (The 2014 study from MIT found that the U.S. could reduce carbon dioxide emissions by up to 35 million tons annually and save $6 billion a year by switching to higher octane fuel—in this case 98 octane.)

[10] *See* Everett Wheeler, *US refiners consider boosting octane to maintain domestic market share*, S&P Global Market Intelligence, (March 15, 2018), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/43892604.

Furthermore, at 95 RON, the automobile industry could meet "roughly one-third of future [Corporate Average Fuel Economy (CAFE)] reduction required under current regulations for which the automobile industry [has] not yet developed technological solutions." *Ibid.*

Enacted by Congress in 1975, the CAFE standards are intended to reduce domestic energy consumption by increasing the fuel economy of automobiles, with the overall goal of ensuring domestic energy security. The most recent standards were promulgated in 2012. *See* Environmental Protection Agency, Final Rule, 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62623 (Oct. 15, 2018).

[11] *See* section VII. Why Will the Market Adjust Promptly?

From the fuel retailing and marketing perspective, an octane solution would be a way to move forward that provides certain benefits to all domestic fuels market stakeholders. Such a solution would provide more predictability, less volatility, and less federal intervention in the fuels market. In implementing any solution, however, retailers will need to see certain adjustments to the fuel regime to ensure they can easily, legally, and affordably sell fuels that consumers want at the pump.[12]

The most important of these adjustments would be misfueling liability protection. Given the diversification of fuel blends, and the bifurcation of consumer vehicles (*i.e.*, some cars will require 95 RON, while others could run on standard 87 octane fuel), retailers will require liability protection from consumer misfueling. This is necessary because in order to reap the benefits (*i.e.*, improved mileage and decreased emissions) of the octane solution, cars manufactured after the transition date must run on higher octane fuel.[13] To properly allocate responsibility in refueling transactions, therefore, retailers should be required to notify consumers via signage of which fuel they are purchasing. Once retailers have done so, however, they have fulfilled their responsibilities and must not be held responsible for a motorist ignoring those signs. In other words, such misfueling liability protection should only apply provided that (1) retailers have correctly followed all applicable laws and regulations pertaining to the sale and labeling of fuels, and (2) consumers have misfueled through no fault of the retailer.[14] In the

[12] Consumers would need to purchase 95 RON fuel because that would be what their car engines (produced after a certain date) would require.

[13] This transition would be analogous to the phase-in of leaded fuel in the 1970s.

[14] *See generally* U.S.C. § 7545; *see also* 40 C.F.R. 80.1504; *see also* EPA, Final Rule, Regulation to Mitigate the Misfueling of Vehicles and Engines with Gasoline Containing Greater Than Ten Volume Percent Ethanol and Modifications to the Reformulated and Conventional Gasoline Programs, 76 Fed. Reg. 44406 (July 25, 2011); *see also* Federal Trade Commission, Final Rule, Automotive Fuel Ratings, Certification and Posting RIN 3084-AB390, 81 Fed. Reg. 2054 (Jan. 14, 2016).

Today, if a consumer misfuels (*i.e.*, puts fuel in a non-approved engine), retailers can be held responsible for violating the Clean Air Act and be subject to fines of up to $37,500 per violation. Even if the retailer is fully compliant with EPA's misfueling mitigation requirements, it may be subject to civil litigation under the Act's private right of action provision. *See* 42 U.S.C. § 7604.

transition to a national octane standard, therefore, there must be a mechanism for the government to disincentivize both deliberate and accidental consumer misfueling and protect retailers who follow the rules.[15] Otherwise, too many retailers will be reluctant to sell the higher octane fuel that newer cars will need to run.

In addition, ethanol is likely to play a critical role in the higher octane standard regime—and as the market evolves, there may be demand for fuels containing higher blends of ethanol (*i.e.*, blends containing more than 10 or 15 percent ethanol). To expedite the market's ability to respond to demand and to support manufacturers producing higher compression engines, EPA's fuel registration process needs to be streamlined. EPA will need to expeditiously clarify registration and other requirements for any new fuels and fuel blends offered under the octane regime. These changes will need to be accompanied by any other regulatory changes necessary to ensure a smooth transition from the current regime to a solely RON regime, including: (1) amending the Petroleum Marketers Practices Act;[16] (2) directing EPA to amend Product Transfer Document requirements;[17] and (3) directing EPA to facilitate and expeditiously process registration for 95 RON gasoline. Retailers will also need assurances that signage requirements at the federal level will preempt state-level requirements to ensure standardized requirements nation-wide.

Legislation introduced in the past would have addressed many of the retailer liability concerns relating to selling fuels containing more than 10 percent ethanol. *See* H.R. 4345, the Domestic Fuels Protection Act of 2012, 112th Cong. (2012)(introduced by Rep. John Shimkus (R-IL)); H.R. 1214, the Domestic Fuels Protection Act of 2013, 113th Cong. (2013))(introduced by Rep. John Shimkus (R-IL)).

[15] For example, during the transition from leaded to unleaded fuel, retailers were required to install different size nozzles at pumps, which were designed to prevent accidentally fueling leaded gasoline into unleaded vehicles (which automakers designed with smaller fill pipes). To disincentivize deliberate misfueling, the government could consider fining consumers at vehicle inspections or otherwise preventing them from re-registering vehicles if there is evidence of misfueling (i.e., fuel tank discoloration reflecting dyed fuel).

[16] 15 U.S.C. §§2821, 2822.

[17] *See generally* 40 C.F.R. §§80.1503 and 80.1453.

In addition, the anachronistic limitation of the 1lb. waiver to E10 should be eliminated. To ensure the greatest fuel component flexibility, current law will need to be amended to provide a 1 lb. waiver for fuel blends that have a RVP equal to or lower than that of E10. E10 itself is already the recipient of a 1 lb. waiver that was granted in 1978 and if new fuel blends are able to match or stay under the RVP of E10, these fuels ought to be granted a waiver as well. This is not to say, however, that E15 or any other specific blend should be mandated under the new plan. The octane solution simply allows for these or any other fuels that meet octane and RVP specifications to be sold, with the market dictating what blends are sold in what areas. In some areas, blends may be more petroleum-heavy, while in others, ethanol or other renewable fuels may feature more prominently.

Finally, while fuel retailers and marketers must contend with infrastructure concerns on a daily basis, the octane solution, as aforementioned, does not mandate the sale of any particular fuel blend and existing infrastructure already permits selling 95 RON fuel to consumers. Thus, while the octane standard may spur infrastructure changes over time, this would be a gradual change as the automobile fleet turns over. That is, retailers will not be required to sell E15 or other higher level ethanol blends if they do not want to, which could help them to keep using existing infrastructure. However, to the extent that demand for certain fuel blends is high, retailers may face market pressure to sell these fuels, which would require addressing the infrastructure limitations that prevent retailers from offering higher ethanol blends today.[18]

VI. OCTANE, THE MARKET, AND OTHER STAKEHOLDERS

[18] For example, the Occupational Safety and Health Administration's (OSHA) regulations require retailers to use equipment that has been listed by a nationally recognized testing laboratory as compatible with the fuel the equipment it is storing and dispensing.

In considering any change to the fuels market, it is relevant to consider how the market will adjust to meet the new requirements. In the case of the octane solution, the key to successful retailer integration is the ***flexibility*** of the RON regime. As previously discussed, if a fuel meets RON and RVP specifications, it is up to the market to determine which fuel blends are desired by customers. This gives retailers some ability to provide diversified fuels to meet consumer demands. This is also important for ethanol and renewable fuels producers, as they will still be able to find a market for their products as a fuel component (*i.e.*, oxygenate).

Since the octane solution relies on a performance specification for automobiles, demand for the fuels will be guaranteed, and demand pulls supply. Under the plan, when consumers need to fuel their cars manufactured post-2022 (date to be determined), they will need to purchase a certain type of fuel—minimum 95 RON. Filling the cars with lesser octane fuels would run the risk of damaging the engine, thereby guaranteeing demand by incentivizing consumers to get on board with the new options and buy higher octane fuels.[19] As such, a retailer can do a net present value analysis for capital investment on his or her business based on what he or she believe the supply and demand will be.

Refiners and manufacturers will see a freedom from federal intervention that has generally not been present in the fuels market. The octane solution will incentivize them to sell certain blendstocks based on market forces, but like retailers, refiners and manufacturers can still make their own decisions about what the best products are for them to sell. Similarly, because there would be no mandated octane formula, renewable fuels producers would have the opportunity to compete for business and market share.

VII. CONCLUSION

[19] The idea is similar to the switch from leaded to unleaded gasoline in the 1970s. Changes in automobile designs meant that consumers needed to buy unleaded fuel or risk misfueling.

In conclusion, the octane solution outlined above has the potential to provide market freedom and improve both business and consumer choice regarding liquid fuels. The RON and RVP specifications will incentivize the development of higher performance, cleaner engines, with better fuel mileage. Overall, the U.S. fuels market will be able to function in a more flexible manner, with less federal intervention and according to free market forces.

With proper safeguards, including misfueling liability protection, clarification of related laws and regulations, a 1 lb. waiver for certain fuels, and consideration of retailer infrastructure concerns, the retail community will be able to ensure a smooth transition to an octane regime that will benefit government, businesses, and the American consumer.

Thank you for the opportunity to testify before you today. I am happy to answer any questions this testimony may have raised.

Mr. SHIMKUS. The gentleman yields back time. The Chair thanks the gentleman.

The Chair now recognizes Emily Skor, chief executive officer of Growth Energy.

Welcome. You are recognized for 5 minutes.

STATEMENT OF EMILY SKOR

Ms. SKOR. Good morning, Chairman Shimkus, Ranking Member Tonko, and members of the subcommittee. Thank you for the opportunity to discuss the contributions of ethanol to high-octane fuels and future vehicle fuel economy standards.

My name is Emily Skor, and I am the CEO of Growth Energy, America's leading biofuels trade association, proudly representing 89 producers, 83 technology innovators in the supply chain, and tens of thousands of supporters across the country, including in Illinois. We work to bring consumers better choices at the pump, grow America's economy, and improve the environment for future generations.

Ethanol is a homegrown biofuel that is now blended into 97 percent of standard gasoline, meeting more than 10 percent of our motor fuel needs. Ethanol-blended fuels have the highest octane of any available liquid alternative and allow for better-performing engines that deliver greater fuel efficiency.

American biofuels are ready to move America forward. With a stable policy and access to drivers, we can deliver low-carbon, low-cost, high-performing, sustainable vehicle fuel solutions.

Congress recognized the need for a more diverse and stable fuel supply and enacted the Renewable Fuel Standard to drive innovation and investment in renewable biofuels and open access to the marketplace. This energy policy is successfully driving advances in cellulosic ethanol, with plants operating at commercial scale, converting corn kernel fiber, corn stover, wood waste, and other biomass feedstocks into high-value energy.

To continue our progress and fulfill congressional goals, U.S. consumers must have greater access to alternative fuel choices at the pump. Growth Energy has been working with fuel retailers to build the marketplace for fuel with higher blends of ethanol, such as E15 and E85, as well as install the infrastructure that can be used for high-octane midlevel ethanol blends, such as E30.

Today, low-cost higher blends are available at thousands of gas stations around the country. Consumers have already driven 4 billion miles on E15 and are ready to use this fuel nationwide year-round.

As fuel economy standards become increasingly stringent in the U.S. and worldwide, auto manufacturers are working toward more efficient engines that require high-octane fuels to operate effectively and lower greenhouse gases. Ethanol is a ready solution. With a natural 113 octane, ethanol has a lower carbon content than the gasoline components it replaces and provides increased engine efficiency to reduce greenhouse gas and criteria pollutant emissions.

Growth Energy has been a leader in pushing for higher octane midlevel ethanol blends. We submitted the first proposal for a 100 RON E30 fuel nearly 7 years ago.

Robust research by national labs, automakers, and other scientific institutions has explored the myriad benefits of high-octane fuels and specifically a midlevel blend in the E20 to E30 range. When paired with various higher compression ratio engines, these fuels increase vehicle engine efficiency, lower tailpipe emissions, and increase use of renewable fuel.

There have been recent discussions about moving to solely a 95 RON or 91 octane fuel standard. While we applaud any move to higher octane fuels, a 95 RON could easily be met with today's premium gasoline and there would be little to no incentive for oil refiners to move to higher biofuel blends. The past decade has shown oil companies will actively ignore economic incentives just to prevent market entry of higher ethanol blends.

We cannot assume that such a modest increase in octane will drive growth in demand for American-made biofuels and agriculture without the access to market provided by the RFS. Only by coupling a stable RFS to maintain market access with a significant boost in octane from a midlevel ethanol blend can consumers realize significant cost savings, increased engine efficiency, and substantial environmental benefits.

Biofuels must be part of any long-term plan for engine efficiency and greenhouse gas reduction. However, any discussion of our future fuel mix cannot turn back the clock on the RFS. We cannot support a modest move in octane at the expense of one of the most successful domestic energy policies and the only legislated carbon reduction program.

Thank you for the opportunity to testify, and I am happy to answer any questions.

[The prepared statement of Ms. Skor follows:]

Testimony of Ms. Emily Skor, CEO, Growth Energy

Subcommittee on the Environment

High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities

April 13, 2018

Chairman Shimkus, Ranking Member Tonko:

Thank you for the opportunity to appear today to discuss the importance of ethanol and the Renewable Fuel Standard (RFS) and their contributions to high-octane fuels and future fuel economy standards for vehicles. My name is Emily Skor, and I am the CEO of Growth Energy. Growth Energy is the leading trade association for the ethanol industry, and we are proud to represent 89 producers, 78 companies involved in the ethanol supply chain, and tens of thousands of ethanol supporters around the country. We are working to bring consumers better choices at the fuel pump, grow America's economy, and improve the environment for future generations. Our growing membership base now represents nearly half of all American ethanol plants along with many of the largest and most prominent fuel retailers in the country. In 2016 alone, our industry contributed over $44 billion to the nation's Gross domestic product (GDP) and supported 360,000 American jobs.

Ethanol is a homegrown biofuel that is now blended into 97 percent of our fuel supply, meeting more than 10 percent of our motor fuel needs. And because ethanol blended fuels have the highest octane of any available liquid alternatives, it allows for better performing engines that have greater fuel efficiency. Furthermore, our industry today

produces over 15 billion gallons of renewable fuel and over 44 million tons of animal feed, which helps meet our nation's need for fuel and food.

Every gallon of clean-burning ethanol decreases our dependence on foreign oil. In fact, since 2005 — the year the RFS was enacted — we have helped cut our oil imports by more than half. But gasoline consumption has increased over the last five years, and ethanol can help meet that growing demand for fuel. In 2016 alone, biofuels displaced 510 million barrels of oil. Overall, American ethanol has increased our energy security, reduced our dangerous dependence on foreign oil, created American jobs, and improved our nation's environment.

The American biofuels industry stands ready to move America forward. With a stable policy and market access, we believe we can deliver low-carbon, low-cost, high-performing, sustainable vehicle fuel solutions. This will save consumers money at the pump, increase vehicle performance, and improve our environment.

THE RENEWABLE FUEL STANDARD IS KEY TO BIOFUELS INNOVATION

In years past, consumers had limited choices when it came to alternative transportation fuels. Congress recognized the importance of having a more diverse and stable fuel supply and enacted the RFS in 2005. Congress then revised it further in 2007 to specifically drive innovation and investment in biofuels of all kinds. The RFS set forth a long-term predictable energy strategy to blend 36 billion gallons of renewable fuel into our transportation fuel supply by 2022 and beyond. With the stability provided by the

RFS, our industry is now successfully producing more than 15 billion gallons of ethanol. The RFS is lowering our dependence on foreign oil, keeping our air clean, and is essential to the topic of the hearing today. It is providing consumers access to more affordable fuel options that are also good for engine performance. The RFS is a critical component to the success of our nation's rural economy. The policy supports nearly 360,000 U.S. jobs while saving taxpayers billions of dollars in farm program payments. In fact, moving to higher blends such as E15 will create an additional 136,000 jobs. It is obvious that ethanol production has provided an essential market for our nation's grain farmers and has revitalized rural communities around the country.

The RFS program is also driving considerable investment in the next generation of advanced biofuels, like cellulosic ethanol. These advanced biofuels can reduce emissions by 100 percent, and we are now seeing the first commercial-scale cellulosic ethanol plants bringing advanced biofuels to the market. These next generation biofuels are made today by turning corn kernel fiber, corn stover, and other feedstocks into high-value energy. In the past, rulemaking delays by the Environmental Protection Agency (EPA) to enforce statutory targets set by the RFS have led to a halt in investment in advanced biofuels. Cellulosic ethanol production is now a reality, and it is vital that the RFS be implemented as Congress intended to reach the statutory goals set by the program.

RECENT THREATS TO THE RFS AND HIGHER BIOFUEL BLENDING

While delayed RFS rulemaking in the past has led to a halt in investment and the growth of higher blends, more recently we have seen several actions taken by EPA that have significantly impacted the marketplace and further growth in higher ethanol blends. First, we saw EPA agree to absolve the Philadelphia Energy Solutions (PES) Refinery and notably, its wealthy investors of its obligations under the Clean Air Act even though they have had more than a decade to invest in higher biofuel blending. The PES settlement alone resulted in these wealthy investors being released from nearly 500 million renewable fuel credits. Next, we have seen numerous back-door waivers provided to refiners – including for oil giants. Only recently have some of these waivers come to light. In its 2018 RFS rulemaking, EPA discussed some of these waivers in aggregate again reducing obligations by more than 300 million renewable fuel credits. These actions taken together have the impact of taking away of nearly 1 billion gallons of demand for homegrown biofuels as well as for the related demand in American agriculture.

It is imperative that the RFS not be undermined and that the intent of Congress to further drive innovation and to continue to provide access to the marketplace for renewable fuels be upheld.

MOVING TO HIGHER LEVEL ETHANOL BLENDS

For the RFS to continue to succeed as Congress intended and continue to drive innovation and investment in our rural economy as well as in next generation biofuels, U.S. consumers need to be given access to alternative fuel choices at the pump. In

2011 the EPA approved the sale of E15 for all 2001 and newer vehicles. Since that time, Growth Energy has worked with fuel retailers to build the marketplace for higher levels of biofuels, such as E15, E85, and installing key infrastructure that can be used for high-octane, midlevel ethanol blends such as E30. Today, these higher ethanol blends are available at thousands of gas stations around the country, and with E15, consumers are saving 3 to 10 cents per gallon. Major retailers such as Sheetz, Kum and Go, RaceTrac, Kwiktrip, Quiktrip, Thorntons, Caseys, Mapco, Protec Fuels, Family Express, Murphy USA, Cenex, and Minnoco are making these cost-competitive ethanol blends available to more and more consumers by offering them at more than 1300 high-volume fuel locations in 29 states including Colorado, Georgia, Illinois, Michigan, Mississippi, North Dakota, Ohio, Tennessee, Texas, and West Virginia.

REID VAPOR PRESSURE (RVP)

While we continue to grow the market for E15 and higher ethanol blends, the largest impediment to market growth is the restriction on summer sales from Reid Vapor Pressure. Reid Vapor Pressure, or RVP, is the term used to measure the evaporative emissions of a fuel. In 1990, Congress limited RVP to 9 pounds per square inch (psi) as part of a larger effort to combat smog during the summer fueling season, which lasts from June 1 until September 15. Under this provision, fuel blended with 10 percent ethanol (E10) would be granted a 1 psi waiver from RVP requirements, allowing E10 to be sold year-round nationwide. This 1 psi waiver was extended in part because ethanol blended fuels reduce other types of emissions, including carbon monoxide, tailpipe, and particulate emissions. The waiver applied only to ethanol fuel blends E10 and lower and

excluded ethanol blends above 10 percent, even though the overall RVP decreases as the percentage of ethanol blends increases. Therefore, when E15 was approved as gasoline for 2001 and newer vehicles, it did not receive the same 1 psi waiver that was extended to E10, and E15 cannot currently be sold year-round nationwide. No other fuel product on the market is treated like E15. Every other large-scale, commercially available liquid fuel can be sold the same way year-round. However, in the case of E15 and potentially higher ethanol blends, without the technical regulatory fix in H.R. 1311, fuel retailers are forced to change fuels or relabel E15 as flex-fuel only during the summer fueling season (June 1 — September 15). The number of stations selling E15 is rapidly growing, resulting in more pumps that need to be relabeled twice a year at an approximate annual cost of $200 to switch labels at the beginning and end of the summer fueling season — on every single dispenser. With more than 1,300 retail stations in 29 states currently selling E15, it is estimated that roughly 11,000 fuel pumps sell E15. For 2017, this switching cost was almost $2.2 million. That is more than $2 million in lost revenue for other store upgrades. And that $2 million nets the U.S. zero additional environmental benefit. Given that there could be 2,000 active E15 stations by the end of this year, the switching cost alone in 2018 could be almost $5 million.

HIGH-OCTANE FUELS AND MIDLEVEL ETHANOL BLENDS

While E15 is approved for all 2001 and newer automobiles, representing roughly 90 percent of the vehicles on the road today and has been run for nearly 4 billion consumer miles without any issues, I want to talk more about ethanol's substantial benefits as a high-octane fuel.

Both worldwide and U.S. fuel economy standards for vehicles are increasingly becoming more and more stringent. Automobile manufacturers are being forced to move toward higher efficiency engines that require high-octane fuels to operate effectively, meet fuel economy standards, and lower greenhouse gases. Ethanol continues to be the most valuable and competitive source of octane in the world, and because it is also lower in greenhouse gas emissions, it would provide substantial benefits to automobile manufacturers.

Growth Energy has been an industry leader in advocacy in this area, first commenting to both the U.S. EPA and the California Air Resources Board on the need for higher octane, midlevel ethanol blends when the greenhouse gas standards for vehicles were being first developed in 2012. At that time, we submitted a proposal for a 100 Research Octane Number (RON), E30 fuel for both vehicle certification and for consumer use. The science supporting the benefits of a high-octane fuel -- specifically a midlevel ethanol blend in the E20 to E30 range in conjunction with a high compression ratio engine – is not new and has been well explored by several national laboratories including Oak Ridge National Laboratory, National Renewable Energy Laboratory, and Argonne National Laboratory as well as automobile manufacturers and other scientific institutions. Ethanol has a very high octane number relative to other gasoline hydrocarbons, has a lower carbon content than the gasoline components it generally replaces, and has many other benefits that assist in combustion to increase engine efficiency and reduce both tailpipe greenhouse gas and criteria pollutant emissions.

The key studies that have been conducted over the past five years that highlight the efficiency improvements and environmental benefits associated with midlevel ethanol blends include:

- Leone, T., Anderson, J., Stein R. et al., *Effects of Fuel Octane Rating and Ethanol Content on Knock, Fuel Economy, and CO2 for a Turbocharged DI Engine*, SAE 2014-01-1228, April 1, 2014.

- Leone, T., Anderson, J. et al., *The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency*, Environmental Science and Technology, 2015, 49, 10778-10789.

- West B, McCormick, R., Wang M. et al., *Summary of High-Octane, Mid-Level Ethanol Blends Study*, ORNL/TM-2016/42, July 2016.

- Jung, H., Shelby, M., Stein, R. et al., *Effect of Ethanol on Part Load Thermal Efficiency and CO2 Emissions of SI Engines*, SAE 2013-01-1634, April 8, 2013.

- Leone, T., Anderson, J. et al., *Fuel Economy and CO2 Emissions of Ethanol-Gasoline Blends in a Turbocharged DI Engine*, SAE 2013-01-1321, April 8, 2013.

To briefly summarize, multiple studies have shown that a high RON, midlevel ethanol blend (e.g. 96-RON E20 or 100-RON E30) when paired with various higher compression ratio engines yield tailpipe CO2 emissions reductions of at least 5 percent,

which in most instances were also coupled with efficiency gains. Some studies also showed significant volumetric miles per gallon savings associated with the higher efficiency engines and a high-octane fuel. One study that was submitted to EPA in response to their Draft Technical Assessment Report (TAR) by Air Improvement Resources, "Evaluation of Costs of EPA's 2022-2025 GHG Standards with High Octane Fuels and Optimized High Efficiency Engines," showed that the use of a 98 RON, E25 would reduce the cost of a MY 2025 vehicle by $400 and a popular crossover SUV by as much as $873.

Not only are the benefits of midlevel ethanol blends well understood by the scientific community, but the automobile industry has for years acknowledged the importance of affordable, high-octane fuels coupled with high-compression ratio engines as important to attaining regulatory compliance and improving vehicle performance in the most economical manner possible. A couple of examples can be found below:

- In 2013, Daimler (Mercedes-Benz) identified a worldwide strategy that incorporates E20 to E25 as the main grade gasoline fuel for the 2017-2020 period because "[i]ncreased octane with midblend ethanol fuels is [the] key to simultaneously achieve GHG compliance with high customer satisfaction." "Advanced Powertrain Technology Coupled with Octane & Ethanol – Benefits and Opportunities" at 19, William Woebkenberg, Mercedes-Benz Research and Development North America, 2013 SAE High Octane Fuels Symposium.

- Ford Motor Company, which has done extensive research into high-octane fuels, highlighted the GHG emissions benefits of biofuels in its 2014/2015 Sustainability Report and referenced the efficiency gains of naturally high-octane ethanol, with optimized engines. See Ford Sustainability Report 2014/2015, available at: http://corporate.ford.com/content/dam/corporate/en/company/2014-15-Sustainability-Report.pdf

When you examine the data, there are clear benefits of moving to a high-octane, midlevel ethanol blend, such as E30, including vehicle engine efficiency, lower tailpipe emissions, and increased use of renewable fuel. We believe that the use of midlevel ethanol blends will continue to drive investment in more efficient vehicles, as well as more advanced biofuels, such as cellulosic ethanol.

However, we cannot move modestly to an octane level that would simply be met with today's existing, premium gasoline as that would deny consumers significant cost savings, increased engine efficiency, and significant environmental benefits. Recently, there have been discussions about moving to a 95 RON fuel. While we support the move to higher octane fuels, a 95 RON fuel could easily be met with today's premium gasoline, and there would be little to no incentive to move to biofuel blends above 10 percent. Additionally, we cannot assume that a modest increase in octane to 95 RON will be the necessary driver to continue to grow demand for American-made biofuels and for corn without the access to the market provided by the RFS. Only with a stable RFS and with a significant boost in octane, coupled with a midlevel ethanol blend, can these substantial benefits be achieved.

We can and will continue to support the development and use of high-octane, midlevel ethanol blends for the use in today's and future vehicles; however, we cannot support what would only be a modest move in octane at the expense of one of the most successful energy programs in the last decade with the RFS.

I thank you for the opportunity to testify and welcome your questions.

Mr. SHIMKUS. Thank you.

The Chair how recognizes Mr. Dan Nicholson, vice president, Global Propulsion Systems, General Motors, on behalf of the United States Council for Automotive Research.

You are recognized for 5 minutes.

STATEMENT OF DAN NICHOLSON

Mr. NICHOLSON. Chairman Walden, Chairman Shimkus, Ranking Member Pallone, and Ranking Member Tonko, and members of the committee, my name is Dan Nicholson, vice president of Global Propulsion Systems for General Motors Company. I am here today representing General Motors, a member company of the United States Council for Automotive Research, U.S. CAR. I appreciate the committee's invitation to appear before you to discuss the importance of increased octane in gasoline.

As you know, the automotive industry is changing at an unprecedented pace. This requires all major mobility stakeholders to be better coordinated and to develop implementation strategies together.

As the committee explores options, such as changes to U.S. fuel standards that may include higher octane gasoline, it is necessary that the industries involved in this opportunity work more closely together in order to ensure that consumers benefit and our industries remain strong.

We believe increasing the minimum octane level in U.S. gasoline for new vehicles will be a win for all industries and, most importantly, consumers.

Today you will hear from many stakeholders involved in changing the liquid fuel market. This change requires the commitment of all parties. I would now like to take a few minutes to discuss the role of the automotive industry.

Currently, many facets of the traditional automotive business are being disrupted. Innovative technologies are driving tremendous advancements in everything from safety and vehicle connectivity, to fuel efficiency and electrification.

Additionally, societal trends, like urbanization and sustainability, are changing the way customers think about and interact with mobility. As GM's chairman and CEO, Mary Barra, likes to say, "The auto industry will change more in the next 5 years than it has in the last 50 years." We believe this gives us opportunity to make cars cleaner, safer, smarter, more efficient, and more fun to drive than ever before.

As part of this significant shift, the automotive industry has taken unprecedented steps to improve engine efficiency through downsized turbocharged engines, improved multispeed transmissions, and a host of eco-friendly improvements, all with the goal of meeting customer requirements while delivering improved efficiency.

The global automotive market is growing, and multiple technologies and solutions will be needed to match demand. Octane is one of those solutions. We have an opportunity to play a large role in offering consumers the most affordable option for fuel economy improvement and greenhouse gas reduction.

We believe a higher efficiency gasoline solution with a higher research octane number, or RON, is very important to achieving this.

U.S. CAR research shows that 95 RON makes sense from the viewpoints of both refiners and fuel retailers. As you may know, this is the same level of RON that Europe has used as their minimum level for many years. Without this new fuel, we will continue to endure the impacts of fuel variation and forego related available fuel economy improvement opportunities.

Ultimately, policy leadership is key to bringing about fundamental change in the market. Your leadership is critical here. We need to work together to improve the fuel in the U.S. market to take advantage of engine designs that are more efficient and provide significant large-scale fuel economy improvements and corresponding reductions in greenhouse gas emissions. And we must do so in a way that makes sense for consumers, which means developing a favorable consumer model for fuel and coordinated retail introduction.

Thank you again for the opportunity to be here today and to discuss the advantages of high-octane fuels used in high-efficiency vehicles.

[The prepared statement of Mr. Nicholson follows:]

Written Testimony of Dan Nicholson, General Motors Vice President of Global Propulsion, Before the House Committee on Energy and Commerce Subcommittee on Environment

High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities

April 13, 2018

Chairman Walden, Chairman Shimkus, Ranking Member Pallone and Ranking Member Tonko and members of the committee, my name is Dan Nicholson, Vice President of Global Propulsion Systems for General Motors Company. I am here today representing General Motors, a member company of the United States Council for Automotive Research (USCAR).

I appreciate the Committee's invitation to appear before you to discuss the importance of increased octane in gasoline. As you know, the automotive industry is changing at an unprecedented pace. This requires all major mobility stakeholders to be better coordinated and to develop implementation strategies together. As the Committee explores options, such as changes to U.S. fuel standards that may include higher octane gasoline, it is necessary that the industries involved in this opportunity work more closely together in order to ensure that consumers benefit and our industries remain strong. We believe increasing the minimum octane level in U.S. gasoline for new vehicles will be a win for all industries and, most importantly, consumers.

Today you will hear from many stakeholders involved in changing the liquid fuel market. This change requires the commitment of all parties. I would now like to take a few minutes to discuss the role of the automotive industry.

Currently, many facets of the traditional automotive business are being disrupted. Innovative technologies are driving tremendous advancements in everything from safety and

vehicle connectivity, to fuel efficiency and electrification. Additionally, societal trends like urbanization and sustainability are changing the way customers think about and interact with mobility.

As GM's Chairman and CEO, Mary Barra, likes to say: "The auto industry will change more in the next five years than it has in the last 50 years." We believe this gives us opportunity to make cars cleaner, safer, smarter, more efficient, and more fun to drive than ever before.

As part of this significant shift, the automotive industry has taken unprecedented steps to improve engine efficiency through downsized turbocharged engines, improved multi-speed transmissions and a host of eco-friendly improvements; all with the goal of meeting customer requirements while delivering improved efficiency.

The global automotive market is growing and multiple technologies and solutions will be needed to match demand. Octane is one of those solutions. We have an opportunity to play a large role in offering consumers the most affordable option for fuel economy improvement and greenhouse gas reduction. We believe a higher efficiency gasoline solution with a higher Research Octane Number (RON) is very important to achieving this.

USCAR research shows that 95 RON makes sense from the viewpoints of both refiners and fuel retailers. As you may know--this is the same level of RON that Europe has used as their minimum level for many years. Without this new fuel, we will continue to endure the impacts of fuel variation and forego related available fuel economy improvement opportunities.

Ultimately, policy leadership is key to bringing about fundamental change in the market. Your leadership is critical here. We need to work together to improve the fuel in the U.S. market to take advantage of engine designs that are more efficient and provide significant large-scale fuel economy improvements and corresponding reductions in greenhouse gas emissions. And,

we must do so in a way that makes sense for consumers--which means developing a favorable consumer model for fuel and coordinated retail introduction.

Thank you again for the opportunity to be here today and to discuss high octane fuels used in high efficiency vehicles.

Main Points

- A higher octane standard in the U.S. will promote vehicle efficiency through a combination of improved fuel and corresponding engine technology.
- The U.S. should adopt octane standards that offer consumers true value at the point of sale.
- Higher octane in the retail market, in combination with changes to engines, can offer fuel economy and greenhouse gas savings that are more affordable than other technologies, if commercialized correctly in cooperation with other industries.
- Due to the long lead time for all industries affected, the time to work on this issue is now.

Mr. SHIMKUS. Thank you very much.

Now I would like to recognize Mr. Paul Jeschke, testifying on behalf of the Illinois Corn Growers Association.

We want to welcome you. You are recognized for 5 minutes.

STATEMENT OF PAUL JESCHKE

Mr. JESCHKE. Thank you, Chairman Shimkus, Ranking Member Tonko. Thank you for inviting me here to speak about what high-octane fuel can do for America's farmers.

As a corn farmer from the village of Mazon, Illinois, I never imagined that I would be sitting in this chamber in our Nation's Capital talking about corn-based higher octane fuels.

A growing body of evidence shows that high-octane midlevel ethanol blends offer the most environmentally friendly and cost-effective route to increased vehicle efficiency and lower greenhouse gas emissions.

High-octane gasoline derived solely from hydrocarbons is dirtier and more costly. Today's premium fuels can cost 40 to 80 cents a gallon more than regular unleaded gasoline.

Consumers deserve an affordable high-octane choice at the pump. Ethanol is simply the most cost-effective octane additive available in the marketplace.

A midlevel ethanol blend consists of 25 to 30 percent ethanol. Splash-blend that in today's regular gasoline blend stock and you would end up with an octane rating of 98 to 100 RON, higher than today's premium. This fuel would enable more efficient vehicles and lower greenhouse gas emissions.

High-octane midlevel ethanol blends mean lower costs for both refiners and consumers. These fuels could be made by splash-blending ethanol into existing regular gasoline blend stock with no change at the refinery. These blends would reduce upstream greenhouse gas emissions because ethanol is less carbon intensive, and it would improve air quality as ethanol displaces harmful air pollutants from aromatic hydrocarbons.

Given our trend line gains in corn yields, I believe we can meet the future demand for corn-based ethanol on the land that we are farming now. Farmers are growing more corn, or more octane, per acre now than ever before.

The growth of corn ethanol production has done more to bring profitability to corn farmers than any of the many Government support programs which I have experienced. And ethanol's development was financed to a large extent with farmer investment. This profitability allowed many young people to return to the farm, including my nephew, in my case.

But domestic ethanol use has stagnated and our profitability is again collapsing. Since 2014, Illinois farm profit has been dismal. This projects a bleak future for all of us, but especially these younger farmers.

What can be done? The answer seems clear to me. As our vehicles of the future need higher octane, cleaner-burning fuel, we should look to higher blends of ethanol. Our Nation's fueling infrastructure can already accommodate midlevel ethanol blends, and with only minor investments the needed fueling infrastructure could be readily available nationwide, similar to that of diesel fuel.

Unfortunately, the EPA regulations are stifling both fuel and engine innovations, preventing consumers from enjoying the performance benefits and fuel savings of midethanol blends. Until these barriers are addressed, it is simply not true that a minimum octane standard would provide the biofuel industry with the opportunity to expand its market share.

For ethanol to be free to compete in the market on the basis of its value as an octane enhancer, the EPA's anticompetitive regulations must be corrected.

Some of these regulatory concerns are the same RVP standards for all fuels containing at least 10 percent ethanol, which may have happened yesterday: a new high-octane, midlevel ethanol alternative certification fuel, such as a 98 to 100 E25; a fuel economy equation that does not penalize ethanol blends; a technology-neutral fuel economy and GHG regulatory scheme that treats all alternative fuels alike to the extent that they reduce petroleum consumption and greenhouse gas emissions; an accurate lifecycle analysis of the greenhouse gas benefits of corn ethanol, like those that the USDA and the Department of Energy have already developed.

EPA could address these issues through regulation, without the need for new legislation.

In addition, automakers should warranty new vehicles for ethanol concentrations of up to 25 percent, similar as BMW has already done for some of their vehicles.

Removing these barriers would clear the road for high-octane, high-efficiency vehicles. More details on these points and other observations and suggestions are covered in the written testimony that I have submitted.

I am proud of what we do on my family's farm. I am proud that our corn crop can have a part to play in the high-octane future that is heading our way if we are allowed to do so. America's corn farmers are ready to do our part to deliver.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Jeschke follows:]

Hearing Before the U.S. House of Representatives Committee on Energy and Commerce
Subcommittee on Environment

2123 Rayburn House Office Building
April 13, 2018

"*High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities*"

Statement of Paul Jeschke
On behalf of the Illinois Corn Growers Association

Chairman Shimkus, Ranking Member Tonko, thank you for inviting me here to speak about what high-octane fuel can do for America's farmers.

As a corn farmer from the village of Mazon, Illinois, I never imagined that I would be sitting in this chamber in our Nation's capital, talking about the role that corn farmers could play in growing the high-octane fuel of the not-too-distant future.

But that is exactly what I am here to talk about today. I will make the following key points in my presentation:

- High-octane midlevel ethanol blends would enable improvements in vehicle efficiency beyond what is feasible with high-octane gasoline hydrocarbons.
- Unlike high-octane gasoline, high-octane midlevel ethanol blends would benefit society and rural communities by lowering prices at the pump and reducing pollution while increasing farm income.
- Needless regulatory barriers are blocking midlevel ethanol blends. Unless these barriers to midlevel ethanol blends are removed, a minimum octane standard would do little or nothing to expand the market for ethanol.
- We need:
    - A one-pound RVP waiver for ethanol blends above ten percent,

- A new high-octane, midlevel ethanol blend certification fuel, such as a 98–100 RON E25 fuel;
- A corrected fuel economy equation that does not penalize ethanol blends;
- Technology-neutral fuel economy and greenhouse gas (GHG) equations that do not penalize ethanol blends and treat all alternative fuels alike to the extent that they reduce petroleum consumption and greenhouse gas emissions; and
- A corrected lifecycle analysis of the greenhouse gas benefits of corn ethanol.

Mr. Chairman, now is right time to discuss corn ethanol's role in a high-octane future.

I. High-Octane Midlevel Ethanol Blends Would Enable Improvements In Vehicle Efficiency and Provide A Market Incentive to Blend More Ethanol Into Gasoline.

There is a growing consensus that high-octane fuels are needed to increase vehicle efficiency and reduce greenhouse gas emissions. Automotive engineers believe that continued improvements in internal combustion engine efficiency are simply not sustainable without high-compression engines, enabled by high-octane fuel.[1] For that reason, major automakers, including GM, Ford, and Fiat Chrysler, have endorsed high-octane fuel as a means to deliver greater vehicle fuel economy and performance to consumers at affordable costs.[2]

---

[1] *See* Derek Splitter et al., *A Historical Analysis of the Co-Evolution of Gasoline Octane Number and Spark-Ignition Engines*, 1 Front. Mech. Eng. 1, 17 (Jan. 6, 2016) (the "relaxation of the fundamental coupling between fuel octane number and engine compression ratio" since the 1970s "is a long-term unsustainable trajectory, as for a given octane number engine compression ratio will ultimately be limited by available technologies.").

[2] *See, e.g.*, Sam Abuelsamid, *GM Exec Calls for Premium Gas to Be the New Regular*, Forbes (Mar. 12, 2018); Matt Schmitz, *Automakers Push for Higher Octane to Meet Fuel Economy Standards*, cars.com (Apr. 15, 2016), https://www.cars.com/articles/automakers-push-for-higher-octane-to-meet-fuel-economy-standards-1420684421731/.

But the high-octane fuel that automakers need is not being supplied by the market. Since the beginning of the lead phase-out in the 1970s, octane levels in the U.S. gasoline pool have stagnated and even declined.[3] Premium gasoline's share of the market has also declined.[4] High-octane gasoline hydrocarbons are simply too expensive. Today's premium fuel can be 40 to 80 cents more expensive than regular unleaded, and its octane rating varies.[5] Clearly, consumers deserve more affordable high-octane choices at the pump. That is where corn farmers and corn ethanol come in.

As octane ratings have flat-lined, farm income has been falling, partly as a result of stagnant ethanol demand. Farm incomes have been low on Illinois farms since 2014, eroding our ability to withstand economic stressors.[6] Incomes in 2015 were near zero, the lowest level ever since we have been keeping records, even considering the challenges farmers faced in the 1980s.[7] 2017 incomes were not much better—an average $45,000 per farm.[8] In 2018, farm incomes are projected to be low again.

A high-octane midlevel ethanol blend presents an opportunity to raise farm incomes by expanding the market for ethanol. Ethanol provides the octane that automakers and drivers need. If ethanol is allowed to fill that need, I see opportunities for my grandchildren to farm if they choose to do so.

---

[3] Dep't of Energy, Office of Energy Efficiency & Renewable Energy, Fact #940: August 29, 2016, *Diverging Trends of Engine Compression Ratio and Gasoline Octane Rating*, https://www.energy.gov/eere/vehicles/fact-940-august-29-2016-diverging-trends-engine-compression-ratio-and-gasoline-octane.

[4] Splitter et al., *supra* note 1, at 12 ("[W]ithin the last 10 years, premium fuels sales volume has become stagnant at approximately 10% of the total fuel sales volume. Simultaneously, the absolute cost increase of premium-grade fuel has increased compared to that of regular-grade fuel.").

[5] Splitter et al., *supra* note 1, at 13.

[6] *See* Gary Schnitkey, Forecast of 2017 Net Income on Grain Farms in Illinois: Lower than in 2016 but Better than Expected, farmdocdaily (Nov. 21, 2017), http://farmdocdaily.illinois.edu/2017/11/forecast-of-2017-net-income-on-grain-farm-illinois.html.

[7] *Id.*

[8] *Id.*

A. High-Octane Midlevel Ethanol Blends Would Enable Increases In Engine Efficiency.

Ethanol is simply the most cost-effective octane additive available in the marketplace.[9] A midlevel ethanol blend consisting of approximately 25 to 30 percent ethanol, splashed into today's regular gasoline blend stock, would have an octane rating of 98 to 100 Research Octane Number (RON), higher than today's premium.[10] This enables higher compression ratios in next-generation engines which could yield vehicle fuel economy or performance gains. In addition to its high-octane rating, automotive engineers believe that ethanol's high sensitivity (RON-MON), high heat of vaporization, and improved part-load efficiency could enable further improvements in engine efficiency.[11]

EPA has already recognized that high-octane midlevel ethanol blends would "help manufacturers who wish to raise compression ratios to improve vehicle efficiency as a step toward complying with . . . greenhouse gas and CAFE standards."[12]

Automakers agree. In 2014, the Auto Alliance and the Association of Global Automakers submitted comments to EPA explaining that ethanol's "in cylinder cooling effect" and high-octane rating make a "mid-level gasoline-ethanol blend" particularly well suited for "improv[ing] vehicle efficiency and lower[ing] GHG emissions," through

---

[9] *See* David S. Hirshfeld et al., *Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content*, 48 Envtl. Sci. & Tech. 11065, 11067–68 (2014) (noting ethanol's "high volumetric blending octane value in gasoline: (~115 to 135 RON)"); *see also* Scott Irwin & Darrell Good, *The Competitive Position of Ethanol as an Octane-Enhancer*, 6 farmdoc daily 22 (Feb. 3, 2016) (showing that the price of ethanol is significantly lower than the price of the high-octane aromatics it replaces).

[10] Thomas G. Leone et al., *The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency*, 49 Envtl. Sci. & Tech. 10778, 10780 (2015) (Premium-grade . . . [is] usually listed as 91-93 AKI minimum, corresponding to 96–98 RON") (hereinafter Leone (2015)).

[11] *See id.* at 10,784, 10,779 (listing ethanol's "efficiency benefits independent of octane value"); Thomas L. Darlington et al., *Modeling the Impact of Reducing Vehicle Greenhouse Gas Emissions with High Compression Engines and High Octane Low Carbon Fuels*, SAE Tech. Paper 2017-01-0906, at 4 (Mar. 28, 2017) (same); Hirshfeld, *supra* note 9, at 11065 (noting that in addition to its high-octane value, "[e]thanol also has a high latent heat of vaporization and high sensitivity (RON minus MON), contributing to improvements in knock resistance in direct-injection and turbo-charged engines, allowing further increases in CR. Ethanol can also increase efficiency at part-load operation, regardless of engine architecture.").

[12] Tier 3 Rule, 79 Fed. Reg. at 23528–29.

"increas[ing] the engine compression ratio" and "downsizing of the engine."[13] GM similarly "supported the future of higher octane and higher ethanol content in order to provide a pathway to improved vehicle efficiency and lower GHG emissions."[14] Engineers from Ford, GM, and Fiat Chrysler have shown that blending an additional 20% ethanol into today's E10 gasoline to produce high-octane E30 would enable a three-point increase in engine compression ratios, which would increase engine efficiency by 6% (7% in downsized engines) and would reduce tailpipe carbon dioxide emissions by 6 to 9.1%, depending on the test cycle.[15]

A substantial body of research by the Department of Energy and its national laboratories also indicates that ethanol is an optimal high-octane fuel component. The Department of Energy's Co-Optima project[16] has isolated ethanol as one of a handful of biomass-based blendstocks with the necessary fuel properties to support the development of high-octane fuel vehicles.[17] As early as 2013, Department of Energy scientists at Oak Ridge National Laboratory noted that midlevel ethanol blends such as E30 open the potential for

---

[13] Alliance of Automobile Manufacturers & Association of Global Automakers, Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011-0135-4461, at 52 (July 1, 2013); *see also* Mercedes-Benz, Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011-0135-4676, at 4 (June 28, 2013) ("Higher octane fuels permit higher compression ratios which directly improve efficiency while downsizing engines also results in greater fuel efficiency. The optimized combination of those two actions with gasoline direct-injection provides remarkable gains in fuel economy but requires high octane market fuel—higher octane than is available today.").

[14] General Motors LLC, Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011-0135-4288, at 14 (June 28, 2013).

[15] Leone (2015), *supra* note 10, at 10785, Table 2; *see also* Leone et al., *Effects of Fuel Octane Rating and Ethanol Content on Knock, Fuel Economy, and CO_2 for a Turbocharged DI Engine*, SAE 2014-01-1228, at 22 ("The E30-101 RON fuel enabled increasing CR to 13:1 with improved knock behavior compared to the baseline E10-91 RON fuel at 10:1 CR. At 13:1 CR, the E30-101 RON fuel gave a 6.0% benefit in EPA M/H CO_2 emissions and 9.1% benefit in US06 Highway CO2 emissions.").

[16] The Co-Optima project is a scientific initiative that "aims to simultaneously transform both transportation fuels and vehicles in order to maximize performance and energy efficiency, minimize environmental impact, and accelerate widespread adoption of innovative combustion strategies." Dep't of Energy, Office of Efficiency & Renewable Energy, Co-Optimization of Fuels & Engines, https://www.energy.gov/eere/bioenergy/co-optimization-fuels-engines (last visited September 28, 2017). The initiative is a "collaboration between the U.S. Department of Energy (DOE), nine national laboratories, and industry." *Id*; *see also* John Farrell, Co-Optimization of Fuels & Engines (Co-Optima) Initiative: Recent Progress on Light-Duty Boosted Spark-Ignition Fuels/Engines (June 14, 2017) (explaining the initiative's progress and future plans for spark-ignition fuels and engines research).

[17] Robert L. McCormick et al., *Selection Criteria and Screening of Potential Biomass-Derived Streams as Fuel Blendstocks for Advanced Spark-Ignition Engines*, 10 SAE Int'l J. Fuels Lubr. 442, 454 (2017).

[higher] engine compression ratios and expanded downsize + downspeed powertrain approaches, providing clear pathways to improved vehicle fuel economy using existing engine technologies."[18] For that reason, the study concluded that midlevel ethanol blends "could offer a very plausible path toward simultaneous CAFE and RFS2 compliance."[19]

The National Academy of Sciences (NAS) also agrees that midlevel ethanol blends could enable substantial efficiency improvements. As the NAS found in 2015, increasing compression ratios through the use of high-octane fuel would result in "up to [a] 3 percent reduction in fuel consumption for naturally aspirated engines" and possibly "greater reductions" in "turbocharged engines."[20] The NAS further noted that midlevel ethanol blends "[w]ith a higher minimum octane level" could reduce fuel consumption "by up to 5 percent," and further noted that ethanol's "high-octane rating has the potential to provide for an increase in fuel economy by increasing the compression ratio" in optimized vehicles.[21] The NAS therefore stressed the need to consider "the option to use E30 as a certification fuel" as a path to compliance with future CAFE and GHG standards.[22]

B. High-Octane Midlevel Ethanol Blends Would Be Highly Competitive.

As EPA has recognized, midlevel ethanol blends would "provide a market incentive to increase ethanol use beyond E10."[23] Indeed, high-octane midlevel ethanol blends would increase choice at the pump and lower costs for consumers while simultaneously increasing farm income and lowering RIN costs for refiners.

Midlevel ethanol blends give consumers what they want—clean, efficient fuel at a low cost. A recent study calculates that from 2012 to 2040, the retail cost of a gallon of high-

---

[18] Derek A. Splitter & James P. Szybist, *Experimental Investigation of Spark-Ignited Combustion with High-Octane Biofuels and EGR. 1. Engine Load Range and Downsize Downspeed Opportunity*, 28 Energy & Fuels 1418, 1419 (2014).

[19] *Id.*

[20] Nat'l Research Council, Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles 67, 401 (2015).

[21] *Id.* at 60, 69.

[22] *Id.* at 82.

[23] Tier 3 Rule, 79 Fed. Reg. at 23528–29.

octane E25 fuel would likely average 4 cents *less* than the cost of regular grade E10.[24] Another recent study, prepared by the Defour Group, predicts that a consumer would save $155 in fuel costs over the lifetime of a model year 2025 vehicle by using E25 instead of regular grade E10.[25] Using E25 instead of premium E10 would save a consumer $695 in fuel costs over the lifetime of a model year 2025 vehicle.[26]

These savings would amount to billions of dollars every year nationwide. A study by MathPro, a petroleum refinery consultancy group, estimates that widespread use of a 92 AKI (97 RON) blend of E30 could lower annual aggregate wholesale gasoline costs by $6.4 billion in 2025 and by $11.7 billion in 2035.[27]

Compared to available high-octane alternatives, a midlevel ethanol blend would impose trivial costs on refiners, and no costs at all if EPA simply extends the 1-pound RVP waiver to midlevel ethanol blends, as the Clean Air Act permits. A high-octane, midlevel ethanol blend with a 1-pound waiver could be simply splash-blended into today's regular gasoline blendstock, without any new refinery investments or changes in operations.[28] Even without RVP relief for higher ethanol blends, a MathPro study found that producing a single future 98 RON gasoline with E30 would cost refiners only an additional 1.7 cents a gallon.[29] According to the study, "[t]his small cost increase reflects that fact that these BOBs have octane ratings similar to that of the BOB currently used for Regular-grade E10."[30] By contrast, transitioning to a high-octane fuel with E10 would require significant upgrades at a

---

[24] Darlington, *supra* note 10, at 6 ("[O]ver the projection until 2040, E25 is about 4 cents per gallon lower than E10").

[25] Drake, Comparing the Cost of Two Different Grades of High Octane Motor Fuel in Future High Efficiency Vehicles 14 (2017).

[26] *Id.*

[27] MathPro, Analysis of the Refining Costs and Associated Economic Effects of Producing 92 AKI Gasoline in the U.S. Refining Sector 3, Table S-1 (Oct. 30, 2012). The study assumes that wholesale ethanol remains priced at parity with wholesale gasoline on a per gallon basis, as it has been in the past.

[28] *See* Hirshfeld et al., *supra* note 9, at 11067.

[29] *Id.* at 11068, Table 2.

[30] *Id.* at 11067.

substantial cost to refiners—18 cents a gallon in the case of a 98 RON fuel.[31] Even producing a 95 RON E10 gasoline with an RVP waiver would cost refiners more—2.9 cents a gallon.[32] The math is simple. A high-octane midlevel ethanol blend is the most cost-effective way to produce high-octane fuel.

Midlevel ethanol blends would also reduce greenhouse gas emissions. As AFPM concedes in its testimony, producing higher octane fuel through changes in the gasoline blendstock would "result[] in higher CO_2 emissions from refinery facilities."[33] By contrast, midlevel ethanol blends would actually *reduce* CO_2 and other greenhouse gas emissions on a lifecycle basis.[34]

Midlevel ethanol blends would also be better for air quality than high-octane hydrocarbons. As AFPM admits in its testimony "increasing octane out of the refinery is likely to increase some stationary source emissions," and "regional air quality issues may be challenging."[35] Simply splash-blending more ethanol into gasoline to blend high-octane fuel, by contrast, would reduce refinery emissions. It would also reduce motor vehicle pollution by displacing dirty aromatics with clean-burning ethanol. Expanding ethanol production would also pose no substantial environmental compliance challenge for ethanol plants, as most ethanol plants are outside ozone non-attainment areas—where they do little harm—and many ethanol plants in attainment areas are likely exempted from the Clean Air Act's permitting rules.[36]

---

[31] *Id.* at 11068, Table 2.

[32] *Id.*

[33] Testimony of Chet Thompson, AFPM, at 8.

[34] *See* Han et al., Well-to-Wheels Greenhouse Gas Emissions with Various Market Shares and Ethanol Levels, ANL-ESD-10-15, 64 (2015) (finding that in addition to reducing tailpipe carbon dioxide emissions, E25 would reduce upstream GHG emissions by 5% and E40 would reduce upstream emissions by 10%, compared to regular E10); Hirshfeld et al., *supra* note 9, at 11070 ("For a given RON, refinery CO_2 emissions and crude oil use decrease with increasing ethanol content in the gasoline pool, due primarily to the reduction in BOB volume and RON.").

[35] Testimony of Chet Thompson, AFPM, at 13, 14.

[36] *See* 40 C.F.R. 52.21(b)(1)(i) (excluding "ethanol production facilities" from the definition of "major emitting facility," and thus raising the PSD permitting applicability threshold to 250 tons per year, in contrast to the 100 tons per year threshold that applies to "petroleum refineries").

C. The Ethanol Supply Would Be Adequate to Produce High-Octane Midlevel Ethanol Blends.

Widespread use of midlevel ethanol blends would not strain corn ethanol production. The National Renewable Energy Laboratory and Oak Ridge National Laboratory have modeled several market penetration scenarios for high-octane fuel. An aggressive scenario in which all new vehicles are optimized for E25 after 2018 would require increasing ethanol production to 21.1 billion gallons by 2035.[37] Despite this large increase in the amount of ethanol required for this particular scenario, the study concludes that "feedstock availability and cost are not expected to be obstacles to the substantial development of" high-octane fuels, "across all of the scenarios considered."[38]

A more recent analysis by the Defour Group confirms that if all vehicles produced beginning in 2025 were optimized for an E25 high-octane fuel, approximately 22 billion gallons of ethanol would be required by 2055, meaning that ethanol production would need to increase by only 5.8 billion gallons over 30 years, equivalent to less than a 1% increase in ethanol production each year.[39] Another analysis by ProExporter, an agricultural commodities consultancy, estimates that even if E25 use increased to represent 70% of the motor gasoline supply by 2030, the ethanol supply would be sufficient to meet the needs of the expanded market.[40]

Corn farmers could easily provide enough corn to meet the required ethanol demand. Nationwide adoption of a midlevel ethanol blend would require only a modest increase in the share of the corn crop devoted to ethanol and dried distillers grains (a high-protein, high-nutrient feed that displaces corn feed). In 2016, the U.S. produced slightly over 15 billion bushels of corn.[41] Ethanol and dried distillers grains production used slightly over

---

[37] Caley Johnson et al., *High-Octane Mid-Level Ethanol Blend Market Assessment* 55, tbl.15 (Dec. 2015).

[38] *Id.* at 75.

[39] Drake, *supra* note 25, at 9–10.

[40] The ProExporter Network, Mid-Level Ethanol Blends: Can We Produce Enough Fuel Feedstocks? (Oct. 22, 2015).

[41] USDA, U.S. Average Corn Yield, Crop Production 2016 Summary 11 (Jan. 2017) (15,148 million bushels).

5 billion bushels of corn, or approximately a third of the corn crop.[42] Of that amount, only about 3.5 billion bushels, or about a quarter of the corn crop, is attributable to ethanol.[43] Dedicating an additional 1.5 billion bushels of the corn crop (or 10% of the current crop) to ethanol production would yield an additional 4.2 billion gallons of corn ethanol at today's yields, a supply that is more than adequate to widely commercialize high midlevel ethanol blends.[44] This expansion would not require a substantial expansion of corn acreage. That is not surprising, given that corn farmers are growing more corn per acre than ever before. Just last year, Illinois farmers grew a record crop, with more than 200 bushels of corn harvested per acre. That kind of yield was unheard of when I started farming over four decades ago.

Even this overstates the amount of corn acres required to meet the additional ethanol demand. Corn yields and ethanol plant yields are projected to keep increasing, meaning that every year, fewer acres will be required to sustain the same ethanol production.[45] By contrast, refinery gasoline yields have remained stagnant for decades and are unlikely to increase in the future.[46]

D. The Fueling Infrastructure Would Be Adequate to Support Midlevel Ethanol Blends.

Our Nation's fueling infrastructure can already accommodate midlevel ethanol blends, and with only minor investments the needed fueling infrastructure could be readily available nationwide. In addition to the legacy E85 infrastructure, which can be adapted for

---

[42] USDA, ERS Feed Outlook (Jan. 17, 2017) (5,325 million bushels), *available at* http://www.worldofcorn.com/#corn-used-of-ethanol-and-ddg-production.

[43] This accounts for the fact that "only the starch fraction of the corn kernel (66 percent) is used for ethanol production." USDA, 2015 Energy Balance for the Corn-Ethanol Industry, at 2 (Feb. 2016).

[44] Assuming a yield of 2.8 gallons per bushel, slightly below the running average for 2017. *See* Renewable Fuels Ass'n, Industry Statistics: Monthly Implied Average Ethanol Yield (Gallons per Bushel) (last updated April 1, 2018), *available at* http://bit.ly/2rDqtpO.

[45] USDA, USDA Agricultural Projections to 2026, at 28, tbl.5 (Feb. 2017), *available at* https://www.ers.usda.gov/webdocs/publications/82539/oce-2017-1.pdf?v=42788 (predicting that from the 2015/16 season to 2026/27 season, yields will increase by 20.4 bushels per harvested acre); Energy Info. Admin., Corn Ethanol Yields Continue to Improve (May 13, 2015), https://www.eia.gov/todayinenergy/detail.php?id=21212.

[46] Energy Info. Admin., Data U.S. Refinery Yield, https://www.eia.gov/dnav/pet/xls/PET_PNP_PCT_DC_NUS_PCT_M.xls.

E25,[47] there is a rapidly growing stock of E25-compatible fuel dispensers. Since 2016, Wayne Fueling Systems, one of the country's two major fuel dispenser manufacturers, has only sold dispensers that are E25-compatible.[48] Other manufacturers are likely to follow suit, because E25 equipment is only marginally more expensive than E10 equipment.[49] In addition, "retrofit kits are readily available (for $1,950) that enable an E10 dispenser to safely dispense E25."[50] And "nearly all" underground storage tanks are compatible with E25 and higher ethanol blends.[51]

Corn farmers are doing their part to facilitate the transition to high-octane fuel. Our corn checkoff dollars (the money that corn farmers invest to build markets for our crop), have been used to fund research in high-octane fuels and install compatible pumps, tanks, and lines at retail stations. We have done a small part of this work, and we are ready to do more to build a future in which ethanol is free to compete.

II. Regulatory Barriers Are Blocking Midlevel Ethanol Blends.

High-octane midlevel ethanol blends are the liquid fuel of the future. Unfortunately, that future is being stifled by red tape in Washington D.C. EPA regulations prevent drivers from enjoying the performance benefits and fuel savings of midlevel ethanol blends.

Until these barriers are fixed, it is simply not true that a minimum octane standard would "provide the biofuel industry with the opportunity to expand its market share."[52] The

---

[47] Preexisting E85 dispensers can be used to dispense E25. *See* Dep't of Energy, Handbook for Handling, Storing, and Dispensing E85 and Other Ethanol-Gasoline Blends 3, 12, 29–30 (Feb. 2016). Currently, over 3,300 stations nationwide offer E85. *See* Dep't of Energy, Alternative Fuels Data Center, Alternative Fueling Station Locator, http://bit.ly/2rZo87Y (last visited Oct. 5, 2017). In addition, blender-pumps that can "make mid-level ethanol blends by mixing two parent blends stored in different storage tanks" are increasing in number thanks to funding from the U.S. Department of Agriculture. *Renewables Enhancement and Growth Support Rule*, Proposed Rule, 81 Fed. Reg. 80828, 80831 (Nov. 16, 2016).

[48] Wayne Fueling Systems, *Wayne Standardizes Offering for All North American Retail Fuel Dispensers to E25,/ B20* (Aug. 30, 2016), http://bit.ly/2bOX5F5.

[49] Caley Johnson et al., High-Octane Mid-Level Ethanol Blend Market Assessment 24 (Dec. 2015) (E25 refueling equipment "requires only upgraded elastomer materials.").

[50] *Id.*

[51] *Id.* at 25.

[52] Testimony of Chet Thompson, AFPM, at 2.

reality is that anticompetitive regulations prevent the ethanol industry from expanding its market share, regardless of its value as an octane enhancer.

I discuss these barriers in turn.

A. EPA's Misinterpretation of the One-Pound RVP Waiver Is Blocking Midlevel Ethanol Blends.

EPA has needlessly interpreted the one-pound RVP waiver of the Clean Air Act as limited to E10, making it infeasible to sell higher ethanol blends year-round.

In 2011, EPA approved E15 for use in Model Year 2001 and newer vehicles under a waiver pursuant to the "sub-sim" law, section 211(f)(4) of the Clean Air Act.[53] EPA intended to remove unwarranted regulatory barriers to using biofuels. But that commendable purpose has been frustrated: E15 has failed to achieve widespread market acceptance, because EPA excluded these fuels from the 1 psi RVP waiver statute, limiting the times of the year in which they can be sold. At the time, EPA insisted that a 1 psi RVP waiver was granted by Congress in 1990 to gasoline-ethanol blends of at least 9 volume percent *and no greater than* 10 volume percent ethanol.[54] EPA's interpretation was wrong at the time, and we are pleased to read reports that EPA is preparing to correct its regulation.[55]

The fact is that Congress did not limit the waiver to E10. Congress granted a 1 psi RVP waiver to "fuel blends containing gasoline and 10 percent denatured anhydrous ethanol."[56] Midlevel ethanol blends contain gasoline and 10 percent denatured anhydrous ethanol. And the text of section 211(h)(4) contradicts EPA's interpretation.[57] When Congress adopted the 1 psi waiver statute, it included a special affirmative defense for

---

[53] *Partial Grant of Clean Air Act Waiver Application Submitted by Growth Energy to Increase the Allowable Ethanol Content of Gasoline to 15 Percent*, 76 Fed. Reg. 4662 (Jan. 26, 2011) (hereinafter E15 Partial Waiver).

[54] *See Regulation to Mitigate the Misfueling of Vehicles and Engines With Gasoline Containing Greater Than Ten Volume Percent Ethanol and Modifications to the Reformulated and Conventional Gasoline Programs*, 76 Fed. Reg. 44406, 44433–35 (July 25, 2011) (hereinafter Misfueling Rule).

[55] Kelsey, Tamborrino, Morning Energy: Wheeler-ing and Dealing, Politico (Apr. 12, 2018), https://www.politico.com/morningenergy/.

[56] 42 U.S.C. § 7545(h)(4).

[57] *Id.*

downstream fuel sellers and carriers who can show that, among other things, "the ethanol portion of the fuel blend does not exceed its waiver condition under" section 211(f)(4).[58] E15 blends comply with the text of this requirement: the "ethanol portion" of an E15 blend "does not exceed" the 15 percent ethanol concentration allowed by the sub-sim waiver that EPA granted under section 211(f)(4). This safe harbor confirms Congress's intent to extend the 1 psi RVP waiver to blends containing more than 10 percent ethanol, as long as they are consistent with the sub-sim law.[59] Congress could have limited the affirmative defense to fuel blends with *no more than* 10 percent ethanol, but Congress rejected a bill that would have done just that.[60] Instead, Congress linked the RVP statute to section 211(f), which empowers EPA to approve higher levels of ethanol.

Any notion that Congress intended to limit the 1 psi RVP waiver to E10 was refuted by Congress in 2005. In that year, Congress added section 211(h)(5), allowing States to exempt themselves from the 1 psi waiver's application to "*all* fuel blends containing gasoline and 10 percent denatured anhydrous ethanol."[61] If the 1 psi waiver applied only to E10 and excluded higher ethanol blends, Congress's use of the word "all" would have been superfluous.[62]

EPA's needlessly restrictive interpretation of the 1 psi RVP waiver provision is "unmoored from the purposes and concerns" of the Clean Air Act.[63] The purpose of section

---

[58] *Id.* (second sentence).

[59] In the Misfueling Rule, EPA asserted that the reference to section 211(f)(4) in the deemed to comply provision somehow implies that Congress limited the 1 psi RVP waiver to no more than 10 percent ethanol. 76 Fed. Reg. at 44434. That is illogical. If Congress wanted to limit the 1 psi waiver to E10, it would have specified fuels containing *no more than* 10 percent ethanol, instead of cross-referencing section 211(f)(4), which allowed EPA to approve higher levels of ethanol.

[60] Clean Air Act Amendments, H.R. 3030, 101st Cong., § 214 (1990) 101st Cong., 1st Sess. (July 27, 1989).

[61] Energy Policy Act of 2005, Pub. L. 109-58, § 1501(c), 119 Stat. 594, 1074–75 (2005), *codified at* 42 U.S.C. § 7545(h)(5).

[62] In the Misfueling Rule, EPA said this State exemption provision (section 211(h)(5)) would provide States with no relief from the 1 psi waiver (section 211(h)(4)) if section 211(h)(4) were interpreted to include blends of more than 10 percent ethanol. 76 Fed. Reg. at 44434–35. This argument is circular. Both provisions use the same phrase ("fuel blends containing gasoline and 10 percent denatured anhydrous ethanol"), so the exemption in section 211(h)(5) covers the same class of fuels as the waiver in section 211(h)(4).

[63] *Judulang v. Holder*, 565 U.S. 42, 64 (2011).

211(h) is to control the volatility of commercial gasoline.[64] But EPA's interpretation ensures that only the most volatile gasoline-ethanol blends are sold. As acknowledged by EPA, "the addition of ethanol to gasoline" above 10 percent ethanol "decreases blend volatility."[65] In addition, as EPA has recognized, higher ethanol blends lower the reactivity (*i.e.*, the tendency to form ozone) of the resulting emissions.[66] By restricting the 1 psi waiver to gasoline with no more than 10 percent ethanol, EPA's interpretation discourages the sale of a less volatile fuel with less reactive emissions, undermining the objectives of the RVP control program and increasing ozone pollution.

EPA's interpretation also violates all of Congress's purposes in providing a 1 psi waiver for ethanol blends. Congress granted that waiver to achieve the "beneficial environmental, economic, agricultural, energy security and foreign policy implications" of ethanol blending.[67] Congress determined that a small increase in evaporative emissions was justified by ethanol's countervailing reduction of tailpipe emission: "ethanol burns cleaner than pure hydrocarbon gasoline and thus cause[s] fewer tailpipe emissions."[68] Congress recognized that these benefits of ethanol blending could not be achieved without a waiver because of the high "cost of producing and distributing" a "sub-nine pound RVP gasoline" blendstock.[69] Instead of fulfilling Congress's intent, EPA's restrictive interpretation limits the beneficial implications of ethanol blending. It irrationally requires E15 blenders to purchase costly sub-9 psi RVP blendstocks that refiners are unwilling to sell, and it thereby increases tailpipe and evaporative pollution and dependence on foreign petroleum.

---

[64] Congress enacted the volatility program to reduce "commercial gasoline volatility." S. Rep. No. 101-228, at 109 (1989).

[65] Proposed REGS Rule, 81 Fed. Reg. at 80851.

[66] *See* EPA, Report to Congress on Public Health, Air Quality, and Water Resource Impact of Fuel Additive Substitutes for MTBE 63 (Feb. 2009) ("With additional ethanol use, the ethanol content of VOC should increase. Ethanol is less reactive than the average VOC. Therefore, this change should . . . reduce ambient ozone levels.").

[67] S. Rep. No. 101-228, at 110 (1989).

[68] *Id.*

[69] *Id.*

EPA should revoke that interpretation and affirm that the statutory waiver extends to all gasoline containing 10 percent ethanol, including higher ethanol blends.

B. EPA Should Let Automakers Certify New Vehicles on Midlevel Ethanol Blends.

To sell vehicles designed to run on high-octane midlevel ethanol blends, automakers need to be able to certify their vehicle emissions with these fuels. But no midlevel ethanol test fuel is currently approved.

"Before a manufacturer may introduce a new motor vehicle into commerce, it must obtain an EPA certificate indicating compliance with the requirements of the Act and applicable regulations."[70] To obtain the necessary certificate, automobile manufacturers must test new vehicle models for compliance with air toxic emissions standards using a special "test fuel" (or "certification fuel") whose properties are defined by EPA.[71] The same procedures and test fuel are used to ensure that manufacturers meet NHTSA and EPA's increasingly stringent fuel efficiency and greenhouse gas standards on a fleet-wide basis.[72]

The makeup of the test fuel therefore determines the kinds of engines that car companies are able to design, build, and sell. It also determines the kinds of fuel that may lawfully be sold, because the composition of commercial fuel is governed by the Clean Air Act's "sub-sim" law, which requires that fuels and fuel additives be "substantially similar" to test fuels used in certification.[73]

Under 40 C.F.R. § 1065.701(c), EPA may approve an auto manufacturer's request for an alternative certification fuel.

In the Tier 3 rulemaking that applied this rule to light-duty vehicles, EPA suggested that the Agency would approve an alternative certification fuel "if manufacturers were to design vehicles that required operation on a higher octane, higher ethanol content gasoline

---

[70] *Ethyl Corp. v. EPA*, 306 F.3d 1144, 1146 (D.C. Cir. 2002); *see* 42 U.S.C. § 7522(a)(1) (prohibiting sale of vehicles without a certificate of conformity).

[71] *See* 42 U.S.C. § 7521 (authorizing EPA to prescribe emission standards); *id.* § 7525(a)(4)(A) (authorizing EPA to set and revise "test procedures" and test "fuel characteristics").

[72] *See* 2012 CAFE Rule, 77 Fed. Reg. 62624.

[73] 42 U.S.C. § 7545(f)(1)(B).

(*e.g.*, dedicated E30 vehicles or [flexible-fuel vehicles] optimized to run on E30 or higher ethanol blends)."[74]

But the auto industry has yet to apply for such a fuel, because as discussed below, EPA's erroneous fuel economy equation penalizes ethanol blends.

But EPA does not have to wait for a formal request. EPA should approve a new test fuel on its own initiative, as the Agency has done in the past, so that automakers have the opportunity of designing more efficient vehicles optimized for midlevel ethanol blends.

C. EPA's Erroneous Fuel Economy Equation Is Blocking Midlevel Ethanol Blends.

EPA's badly outdated fuel economy equation (used to demonstrate compliance with CAFE regulations) penalizes ethanol blends and violates the law.[75] The current fuel economy equation includes adjustments meant to control for changes in the test fuel that affect fuel economy. These adjustments implement EPA's obligation to make fuel economy testing on today's fuel comparable to fuel economy testing in 1975 by adjusting for changes in the test fuel that affect fuel economy.[76] This prevents EPA from changing the stringency of the CAFE standards through surreptitious changes in the test fuel.[77]

EPA has not met its obligation under the law, because the current fuel equation fails to adjust for changes in energy content. The fuel economy equation includes and adjustment called the R-factor, a measure of "how vehicles respond to changes in the energy content of

---

[74] Tier 3 Rule, 79 Fed. Reg. at 23528.

[75] *See* 40 C.F.R. §§ 600.113-12(h).

[76] 26 U.S.C. § 4064(c) ("Fuel economy . . . shall be measured in accordance with testing and calculation procedures . . . utilized by the EPA Administrator for model year 1975 . . . or procedures which yield comparable results."); 49 U.S.C. § 32904(c) ("[T]he Administrator shall use the same procedures for passenger automobiles the Administrator used for model year 1975 . . . or procedures that give comparable results."); *see also General Motors Corp. v. Costle*, Nos. 80–3271, 80–3272, & 80–3655 (6th Cir. 1982) (Mem.) (requiring EPA to initiate a rulemaking that would establish an "adjustment factor" reconciling current test procedures with previous ones).

[77] *Ctr. for Auto Safety v. Thomas*, 847 F.2d 843, 846 (D.C. Cir.) (en banc) (Wald, C.J., concurring), *reh'g granted and opinion vacated on other grounds*, 856 F.2d 1557 (D.C. Cir. 1988) (per curiam) ("By inserting the comparability requirement, Congress meant to insure that auto manufacturers be credited only with real fuel economy gains, not illusory gains generated by changes in test procedures.").

the fuel."[78] The current R-factor of 0.6 implies that a 10% change in the test fuel's energy content, for example, causes only a 6% change in fuel economy.[79] Oak Ridge National Laboratory has shown that the current R-factor of 0.6 is too low and should be closer to one.[80] EPA itself has acknowledged that the current R-factor is wrong and suggested that a corrected value might lie "between 0.8 and 0.9."[81] The auto industry has asked EPA to adopt an R-factor of 1.0.[82] But EPA has yet to correct the R-factor.

EPA's failure to fully adjust for changes in test fuel energy content penalizes ethanol by discouraging automakers from using midlevel ethanol blends in certification. A midlevel ethanol test fuel would have a lower energy content than 1975 test fuel. That means that if manufacturers were forced to use the current fuel economy equation to certify vehicles with a midlevel ethanol blend test fuel, they would be penalized for doing so because the illusory fuel economy losses generated by the lower energy content of the test fuel would not be fully corrected.

When EPA fixes the fuel economy equation, automakers will no longer be penalized when they certify on ethanol blends, and they will have a natural incentive to request an alternative certification fuel with higher ethanol content.

D. EPA Rules Unfairly Favor Electric Vehicles, Blocking Midlevel Ethanol Blends.

EPA has unfairly favored electric vehicles in its light-duty vehicle GHG standards.[83] EPA's rules have undermined the broad range of technological choices that Congress

---

[78] Tier 3 Rule, 79 Fed. Reg. at 23531.

[79] *Id.*

[80] Oak Ridge Nat'l Lab., Preliminary Examination of Ethanol Fuel Effects on EPA's R-factor for Vehicle Fuel Economy 12 (2013) ("The current factor of 0.6 which is called out in CFR is clearly too low, and a proper factor for modern vehicles is closer to unity, as might be expected from improved air/fuel ratio control common for more modern vehicles.").

[81] Aron Butler et al., Analysis of the Effects of Changing Fuel Properties on the EPA Fuel Economy Equation and R-Factor, at 1, Memorandum to the Tier 3 Docket, EPA-HQ-OAR-2011-0135 (Feb. 28, 2013).

[82] Tier 3 Rule, 79 Fed. Reg. at 23531 ("[T]he manufacturers commented that . . . EPA should finalize an appropriate test procedure adjustment in the Tier 3 rulemaking, including adoption of an 'R' factor of 1.0.").

[83] *See* Illinois Corn Growers Ass'n & Missouri Corn Growers Ass'n, Comments on EPA's Reconsideration of the Final Determination of the Mid-Term Evaluation of Greenhouse Gas Emissions

wanted to encourage through the CAFE program, including flex-fuel vehicles, by treating electric vehicles as a favored technology for compliance.[84]

As Illinois Corn explained in its comments on EPA's midterm evaluation of the GHG standards, EPA should adopt a technology-neutral regulatory scheme that treats all alternative fuels alike to the extent they reduce petroleum consumption and greenhouse gas emissions. Specifically, in consultation with the Department of Transportation, EPA should design a petroleum-equivalency factor for a midlevel ethanol certification fuel based on its gasoline content, consistent with the Agency's authority to determine "the quantity of other fuel that is equivalent to a gallon of gasoline."[85] For example, when calculating the fuel economy of a vehicle certified with an E25 certification fuel, EPA would use a petroleum-equivalency factor 0.75, because a gallon of E25 fuel contains 0.75 gallons of petroleum-based gasoline.

Under the GHG standards, EPA should treat the ethanol portion of the midlevel ethanol fuel as carbon neutral, as it does with electricity.[86] In its 2010 lifecycle analysis, EPA recognized that carbon emitted from the combustion of ethanol is the same carbon that the corn plant absorbed from the atmosphere as it grew. Therefore, tailpipe emissions add nothing to ethanol's lifecycle carbon emissions.[87] Consistent with that lifecycle analysis, and consistent with EPA's treatment of electric vehicles under the current GHG program, EPA should assume that the ethanol fraction of a midlevel ethanol certification fuel emits net zero carbon upon combustion. By contrast, petroleum tailpipe emissions release carbon stored deep underground for millennia. As the Agency has explained in the past, EPA has

---

Standards for Model Year 2022-2025 Light-Duty Vehicles, EPA-HQ-OAR-2015-0827-9581, at 12–15 (Oct. 5, 2017), https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0827-9581.

[84] *Id.* at 15.

[85] 49 U.S.C. § 32904(c).

[86] Electric vehicles are assumed to emit no greenhouse gas emissions when consuming electricity. 40 C.F.R. § 600.113-12(n).

[87] *See* Renewable Fuel Standard Program, Regulatory Impact Analysis 444 (2010) ("Over the full lifecycle of the fuel, the CO_2 emitted from biomass-based fuels combustion does not increase atmospheric CO_2 concentrations, assuming the biogenic carbon emitted is offset by the uptake of CO_2 resulting from the growth of new biomass. As a result, CO_2 emissions from biomass-based fuels combustion are not included in their lifecycle emissions results."); *accord id.* at 470, Figure 2.6-2 (assuming that corn ethanol has no tailpipe CO_2 emissions).

discretion to consider upstream GHG emission effects when calculating emissions under the GHG standards.[88]

Congress could also act to ensure that midlevel ethanol blends are treated fairly in the fuel economy and GHG standards though legislation.

E. EPA's Lifecycle Analysis of Corn Ethanol's GHG Emissions Underestimates the Potential GHG Reductions of Midlevel Ethanol Blends.

To accurately estimate the GHG benefits of high-octane midlevel ethanol blends, EPA should jettison its outdated 2010 lifecycle analysis for corn ethanol, and adopt the recent lifecycle analysis performed by USDA or the Department of Energy.

In its March 2010 RFS Rule, EPA performed a lifecycle analysis of renewable fuel GHG emissions, as required by statute.[89] EPA concluded that by 2022, corn ethanol produced by biorefineries using natural gas and corn oil fractionation technology would achieve annual lifecycle greenhouse gas (GHG) emissions savings of just 21 percent compared to 2005 gasoline.[90] EPA "recognize[d] that as the state of scientific knowledge continues to evolve in this area, the lifecycle GHG assessments for a variety of fuel pathways will continue to change."[91] EPA therefore committed to "further reassess . . . the lifecycle estimates" on an ongoing basis,[92] and to incorporate "any updated information we

---

[88] *See* 2012 CAFE/GHG Rule, 77 Fed. Reg. at 62819 ("EPA . . . believes that although section 202(a)(1) of the Clean Air Act does not require the inclusion of upstream GHG emissions in these regulations, the discretion afforded under this provision allows EPA to consider upstream GHG emissions[.]"); 2010 CAFE/GHG Rule, 75 Fed. Reg. 25,324, 25,437 (May 7, 2010) (claiming authority to "ma[k]e adjustments to a compliance value to account for upstream emissions").

[89] *See Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program*, 75 Fed. Reg. 14,670, 14,785 (Mar. 26, 2010) (hereinafter 2010 RFS Rule) (representing that the 2010 LCA included the "most up to date information currently available on the GHG emissions associated with each element of the full lifecycle assessment"); 42 U.S.C. § 7545(o)(1)(H) (requiring EPA to perform a lifecycle analysis to determine whether renewable fuels meet the required GHG reduction thresholds under the RFS program).

[90] 2010 RFS Rule, 75 Fed. Reg. at 14,786 ("The results for this corn ethanol scenario are that the midpoint of the range of results is a 21% reduction in GHG emissions compared to the gasoline 2005 baseline."); 2010 RFS RIA, *supra* note 87, at 469–70.

[91] 2010 RFS Rule, 75 Fed. Reg. at 14,765.

[92] *Id.* ("Therefore, while EPA is using its current lifecycle assessments to inform the regulatory determinations for fuel pathways in this final rule, as required by the statute, the Agency is also committing to further reassess these determinations and lifecycle estimates."); *accord id.* at 14,785.

receive into a new assessment of the lifecycle GHG emissions performance of the biofuels being evaluated in [the 2010] rule."[93]

As summarized in a recent report commissioned by USDA, "a large body of information has become available since 2010—including new data, scientific studies, industry trends, technical reports, and updated emission coefficients—that indicates that . . . actual emissions . . . differ significantly from those projected" by EPA's 2010 lifecycle analysis.[94] Whereas EPA's outdated analysis estimated that corn ethanol would only be 21 percent less carbon-intensive than gasoline in 2022, USDA's up-to-date analysis shows that corn ethanol is actually 43 percent cleaner today, and that corn ethanol's advantage will grow to 48 percent by 2022.[95]

EPA has an opportunity to update its lifecycle analysis in its triennial Biofuels Report to Congress. The Energy Independence and Security Act of 2007 requires EPA to submit a Biofuels Report to Congress every three years on the environmental impacts of the RFS.[96] But EPA has not submitted a Biofuels Report since 2011.[97] Following a program evaluation by EPA's Inspector General, which determined that EPA was not meeting its statutory obligations, EPA agreed to submit a new Biofuels Report to Congress by the end of 2017, a deadline that EPA has also missed.[98] EPA can use its forthcoming report to adopt USDA's more accurate lifecycle analysis of corn ethanol's GHG emissions, so that EPA can accurately estimate the benefits of high-octane midlevel ethanol blends.

Correcting these estimates would improve EPA's administration of the RFS and promote Congress's goal of energy independence through renewable fuel production. It

---

[93] *Id.*

[94] ICF, A Life-Cycle Analysis of the Greenhouse Gas Emissions of Corn-Based Ethanol 4–5 (Jan. 12, 2017).

[95] *Id.* at 168.

[96] Energy Independence and Security Act of 2007, Pub. L. 110-140 § 204, 121 Stat. 1492, 1529 (Dec. 19, 2007).

[97] EPA, Office of Inspector General, EPA Has Not Met Certain Statutory Requirements to Identify Environmental Impacts of Renewable Fuel Standard 4 (Aug. 18, 2018) ("ORD issued its first report to Congress in December 2011. . . . [T]here have been no subsequent reports since 2011.").

[98] *Id.* at 14.

would also promote U.S. ethanol exports by signaling to U.S. trading partners that U.S. corn ethanol is a cost-effective means of meeting their carbon-reduction goals. Approximately 42 countries have adopted biofuel blending mandates.[99] Those countries must be persuaded that U.S. corn ethanol imports are consistent with their climate and sustainability policies. Congress should ensure that EPA's forthcoming report accurately accounts for ethanol's substantial greenhouse gas benefits.

[99] United Nations, Second Generation Biofuel Markets: State of Play Report 11 (2016) ("In 2014, mandates are in place in 42 countries. Within these policy frameworks, various jurisdictions mandate specified bioethanol blends.").

Mr. SHIMKUS. Thank you very much for joining us today.

And now I would like to turn to Mr. Chet Thompson, president and CEO of the American Fuel and Petrochemical Manufacturers.

Sir, your full statement is in the record. You have 5 minutes.

STATEMENT OF CHET THOMPSON

Mr. THOMPSON. Thank you, Chairman Shimkus, Chairman Walden, Ranking Member Tonko, members of the subcommittee. Thank you for the opportunity to bat cleanup this morning and provide the AFPM's views on this important subject of higher octane fuel.

As you mentioned, my name is Chet Thompson. I am the president and CEO of the American Fuel and Petrochemical Manufacturers, AFPM. We believe we are uniquely qualified to weigh in on this topic as we represent the U.S. refining industry and supply virtually all of the gasoline used in the country today. So I will use my limited time to focus on a few aspects of my written testimony.

First, AFPM is absolutely intrigued by the possibilities and opportunities that could be afforded by a higher octane fuel. Such fuels, as you mentioned, Mr. Chairman, could be a solution to the RFS that works for all stakeholders.

Again, also as you mentioned, today's hearing comes at a critical time for the U.S. fuel and automotive sectors. The auto industry faces enormous challenges to comply with CAFE while at the same time meeting consumer preferences. The refining industry is dealing with an inefficient and unworkable Renewable Fuel Standard that is only going to get worse with time.

Fuel marketers in the biofuel industry don't have it easy either, to be sure. They are faced with constant uncertainty and never-ending debates about the RFS, making for a very challenging business environment.

Again, these uncertainties will grow worse with every moment we move closer to 2022 when EPA takes over this program. But we believe there is a potential solution for all of this: higher octane fuel.

If done correctly—and by that I am going to get into what "done correctly" means in a minute—higher octane fuel has the potential to make life better for everyone at this table and in this room.

Over the last few years, we have been evaluating the benefits of various octane levels. Our detailed analysis show that a 95 RON performance standard could be an efficient and affordable option to reduce emissions and meet the needs of the auto sector.

A 95 RON standard would help auto companies, as Mr. Nicholson said, comply with CAFE by meaningfully improving the efficiency of the internal combustion engine. By our estimates, 95 RON would reduce greenhouse gas emissions in this country by the equivalent of putting 720,000 EVs on the road each year.

So let me put that number in perspective. In 2016, 200,000 EVs were sold globally. So we are talking about tripling that year after year through 95 RON. And if you look at figure 3 on page 9 of my testimony, you can see that 95 RON is the lowest-cost fuel option for making these gains. Ninety-five RON is the lowest cost option for consumers.

So finally it also has the benefit, 95 RON, of being available and scalable nationwide on the timeline needed by the auto industry. No other octane level can make this claim, not a single one.

So we believe a 95 RON would be good for the ethanol industry, as well. I am sure they appreciate me saying that. We would expect it to provide them with every bit as much ethanol demand as they get under the RFS, and likely more. This is true for a simple reason, because ethanol at the moment is a low-cost source of octane. So it follows that they would thrive under a high-octane performance standard, one done under the free market and not through Government mandate.

Fuel marketers would benefit, as well, as Mr. Columbus said. A fuel-neutral 95 RON performance standard would provide marketers with optionality and flexibility. Importantly, this would translate to the benefit of consumers by creating a transparent and competitive market for all liquid fuels.

Finally, my members would certainly benefit, as well. Sunsetting the RFS and transitioning to a 95 RON performance standard would end mandates, reduce overall compliance burdens, and provide achievable regulatory targets.

So such a standard would require enormous investments from my industry. Tens of billions of dollars would be needed. So we certainly don't take this hearing lightly.

We are, however, willing to entertain it for one simple reason: frankly, as a compromise solution to the RFS that we, again, believe could work for all stakeholders.

But for it to make sense to us, frankly, under any circumstances a 95 RON standard would have to include three elements. First, it would have to be accompanied by a sunset of the RFS. The refining industry simply can't comply with the burdens of the RFS at the same time making investments to bring 95 RON to market. Second, it would have to be implemented over a reasonable period of time. And third, it must include measures to prevent misfueling.

As to the latter, we are certainly in a process now to evaluate all the obstacles that would be brought about by bringing a new fuel to market. We are working on that. These issues are real. But the good news is, through our analysis so far we don't think any of these obstacles are insurmountable.

So in conclusion, AFPM believes that higher octane fuel has the potential to better harmonize our country's fuel and vehicle policies, and for that reason we believe it deserves further consideration and analysis.

We thank you, Mr. Chairman, for the opportunity to be here today.

[The prepared statement of Mr. Thompson follows:]

AFPM
American
Fuel & Petrochemical
Manufacturers

Testimony of Chet Thompson, President and CEO, American Fuel & Petrochemical Manufacturers

U.S. House Energy and Commerce Subcommittee on the Environment

High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities

April 13, 2018

The American Fuel & Petrochemical Manufacturers ("AFPM") appreciates the opportunity to provide testimony on the opportunities and challenges with high octane fuels and vehicles. AFPM believes that there is potential for a transition from the Renewable Fuel Standard ("RFS") to a fuel-neutral, 95-RON octane performance standard that could better address the needs of all stakeholders: the auto industry, marketers, biofuel producers, refiners, and most importantly consumers. But given the enormity of the investments that would be required of the refining industry, implementing a 95-RON octane performance standard could only be done in lieu of—not in addition to—the RFS.

The introduction of a high-octane fuel would raise many challenges and thus is not something that the refining industry takes lightly or is ready to fully endorse at this point. Nevertheless, the refining industry sees enough potential in the concept to further explore it as part of more rational and harmonized fuel and vehicle policies. Existing policies intended to improve the fuel economy of the transportation fleet, increase energy security, and support U.S. farm communities are simply not working as intended.

U.S. automakers are struggling to develop economically viable strategies for complying with increasingly stringent fuel economy standards, while still producing vehicles that comport with consumer preferences. They are forced to manufacture vehicles that consumers do not want or

are too expensive for most to afford. They are caught in the middle of overlapping and competing authorities that make one national program difficult.

The RFS is not working as originally intended, either. Although corn ethanol and biodiesel production have increased over the last decade, they have done so at great expense to consumers and the U.S. refining industry. Renewable Identification Number ("RIN") prices have skyrocketed as the United States approached and hit the E10 blendwall. For most refiners, RFS compliance costs now dwarf many other expenses, threatening the long-term viability of many. The program is riddled with uncertainties, inefficiencies, and fraud. Uncertainties will continue to grow as we move closer to the transition of the program to the full discretion of EPA after 2022.

The conventional ethanol industry cannot extract much more out of the RFS. It has already achieved its maximum mandate of 15 billion gallons and its mandated volumes can only go down at this point. The ethanol industry must look to other avenues to grow its market share.

This is where high octane fuels come in. If done correctly—through free market principles, the sunsetting of the RFS, and implemented over a reasonable phase-in period—higher octane fuels have the potential to benefit all stakeholders. Higher octane fuels, specifically 95-RON, would help auto companies improve the efficiency of the internal combustion engine and comply with fuel efficiency standards. It would provide the biofuel industry with the opportunity to expand its market share. It would end the RFS for refiners and provide product flexibility for the marketers. And it could benefit consumers by creating a transparent and competitive market for all liquid fuels to compete.

AFPM is uniquely qualified to address many of these issues, as our members operate approximately 120 refineries, representing more than 95 percent of U.S. refining capacity. AFPM's members produce the gasoline, diesel, jet fuel, and building blocks for the thousands of products that make innovation and progress possible.

The following written testimony summarizes some of the opportunities and challenges associated with high octane fuels.

1. **AFPM supports a legislative process to reform and eventually sunset the RFS program**. The RFS is characterized by litigation, waivers, volatile RIN prices, phantom fuels, and fraud—issues that will only get worse and more uncertain as the mandates rise and as EPA considers volume resets and a post-2022 regulatory environment where no stakeholder knows how the program will be administered.

2. **There is an opportunity for a transition from the RFS to a fuel-neutral 95-RON octane performance standard to be a more consumer-friendly, cost effective, way to meet the goals of the RFS and fuel efficiency targets**. In particular, a phased-in, fuel-neutral 95-RON octane performance standard for new vehicles could be a better way to deliver on the promises of the RFS, including energy security, environmental performance, and economic help for rural communities. Although AFPM is still exploring the issue with its membership, transitioning from the RFS into a fuel-neutral 95-RON performance standard for new vehicles has the potential to be a win for the consumer, the environment, and the automobile, refining, retail, and ethanol industries.

a. **For consumers, a transition from the RFS to a 95-RON performance standard would help reduce the future cost of compliance to meet efficiency targets while increasing choice in vehicles and fuels.**

b. **For automakers, a 95-RON used in optimized high-compression engines would provide more than a three percent efficiency gain**. This is the greenhouse gas equivalent of 720,000 battery-electric vehicles each year. Among various octane levels, a 95-RON is also the most achievable on a timeline to help meet near-term efficiency targets and it helps preserve one national program.

c. **For conventional biofuels, a 95-RON provides market opportunity and the potential for growth to meet demand for more octane in the United States**. This provides more upside potential than the RFS but does so through market mechanisms rather than fuel-specific mandates.

d. **For marketers, a 95-RON could provide more flexibility to meet the performance standard by maximizing available options**. Various ethanol blends can be used in different areas of the country to best suit the needs of the local consumers.

e. **For refiners, sunsetting the RFS and transitioning to a 95-RON performance standard could reduce overall compliance burdens and provide achievable targets**. Refiners spend billions of dollars each year to comply with the RFS

through an opaque and inefficient RIN market. Eliminating this mandate would be beneficial to consumers without any further changes to the gasoline pool. However, if the industry is asked to produce higher octane fuels, the benefit of a 95-RON octane is that it is largely compatible with the current infrastructure and refiners can sell it in every state, notably California.

3. **A 95-RON octane performance standard for new vehicles would be a significant shift in the fuel and vehicle market and should not be taken lightly**. Implementing such a standard will require time and significant investment. This includes changes to the refining systems, upgrades at retail stations, labeling, and other standards changes. AFPM is committed to better understanding and exploring all these issues with other stakeholders and policymakers before any policy decisions are made.

AFPM recognizes potential in a more rational and streamlined fuels policy, however, given the level of needed investment for higher octane fuel, there is no scenario where AFPM would consider an octane standard in addition to the RFS. Not only is the investment uncertainty associated with the RFS incompatible with a higher octane standard, but the effect would further distort the fuel and vehicles market, undermining any consumer benefit that might otherwise occur.

I. The Role of Octane in Gasoline and Its Relation to Efficiency

Refiners and blenders produce finished gasolines with the required octane specifications needed to meet the needs of different engines optimized around the fuel. At the most basic level, the octane rating of gasoline is a measurement of the fuel's ability to withstand compression before it will ignite. When a fuel prematurely ignites in an engine cylinder, it causes "knock," which

reduces engine efficiency and in severe cases risks engine damage. The higher the octane rating, the more resistant the fuel is to knock and the more compression it can withstand. High compression engines are a fundamental method for improving efficiency, so octane number is a major factor in engine design driving fuel economy.

In the United States, octane is currently measured by the "anti-knock index" ("AKI"). At most retail stations, drivers see three octane grades: 87 (regular), 89 (mid-grade), and 91-93 (premium). To provide these octane grades, refiners produce a sub-octane blendstock that is subsequently blended with ethanol to produce the finished fuel. These blendstocks are known as Reformulated Blendstock for Oxygenate Blending ("RBOB") and Conventional Blendstock for Oxygenate Blending ("CBOB"). There is also a California-specific fuel blendstock known as CARBOB. CARBOB/RBOB is used in areas that require reformulated gasoline, or about 30 percent of the U.S. market. CBOB is used in the remaining 70 percent.

AKI is an average of two other measures of rating octane—the Research Octane Number ("RON") and Motor Octane Number ("MON").[1] RON and MON are simply different measures of a fuel's performance characteristics under different engine operating severity (or load). Octane blending characteristics are not linear, but as a general matter there is approximately an 8-12 point spread between MON and RON values, with RON value being higher. The majority of the world uses RON as the standard octane measurement.

There are many sources of octane, but ethanol is currently an important source. Most gasoline in the United States today contains 10 percent ethanol. Due to its high octane rating, infrastructure

[1] Consumers currently see the AKI formula on the gasoline pump (R+M/2).

investments already in place to use the material, and widespread availability, AFPM believes ethanol would continue to be used approximately at current levels with or without the RFS.

II. The Potential Benefits of 95-RON Gasoline and Limits on Higher RON Levels

Consumers should always be front of mind for stakeholder groups and policymakers. A 95-RON octane could help preserve consumer choice for vehicles and fuels by helping increase efficiency at a lower cost. In fact, combining fuel and vehicle costs of production, the consumer could see an overall benefit compared to other alternatives. In addition to potential consumer benefits, AFPM believes a 95-RON could balance the needs of the auto industry, refining and marketing industries, and ethanol industry.

A. The Automobile Industry and the Environment

The automobile industry faces significant challenges in meeting existing fuel efficiency targets set by EPA and the National Highway Transportation Safety Administration ("NHTSA"). Higher octane fuel would enable use of engines with higher compression ratios to increase engine efficiency. For example, based on conversations with the automobile industry, AFPM observed that a two-point increase in the engine compression ratio yields slightly more than a four percent efficiency increase. This combination of a higher octane fuel with an optimized higher compression engine provides the most realistic, affordable solution to help the automobile industry attain regulatory compliance.

The cost of energy efficiency improvements involves a tradeoff between the cost of producing a higher octane fuel and the cost of other vehicle technology changes to improve efficiency. The graphs in Appendix B shows that as octane value increases, the cost to produce the fuel increases. The higher the octane, the higher the refining investment and operating cost.

However, as the octane of the fuel increases and vehicles can use higher compression engines to get more fuel efficiency, more expensive options to achieve the efficiency are not required.

As a result, it is critical to evaluate any change to fuel and vehicles on a well-to-wheels basis. Based on conversations with the auto industry, a four percent efficiency target is a reasonable target to achieve using a combination of fuel and higher compression engine technologies on a timeline that would ensure market availability during the MY2022-25 compliance period. AFPM worked with the automobile industry to evaluate what the lifecycle effect on CO2 emissions and cost of production would be at different octane levels. Although producing higher octane fuel results in higher CO2 emissions from refinery facilities, these increases are more than offset by the significant reduction in tailpipe CO2 from the new higher compression vehicles. The cost of the emission improvements was lowest between 94-96, compared to meeting all the efficiency improvements with only changes to engine technologies.

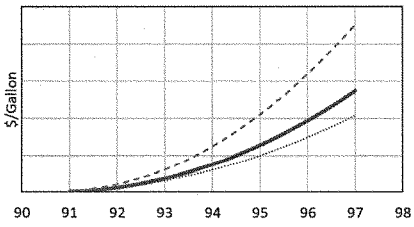


Figure 2: Gasoline Cost of Production Increases as RON Increases

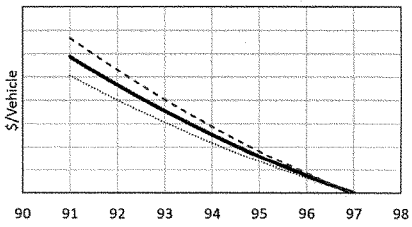


Figure 1: Vehicle Cost of Production Decreases as RON Increases

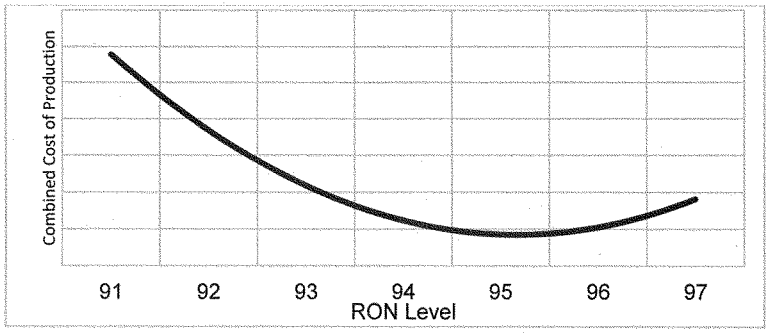


Figure 3: Combined Vehicle and Fuel Impact to Achieve 4% Efficiency Gain

To evaluate the differences between 94, 95, and 96-RON, we evaluated factors outside the refinery system, including regulatory challenges. AFPM concluded that 94-RON had a lower octane rating than current premium and thus would likely be incompatible with the legacy premium vehicle fleet. In evaluating the difference between 95 and 96-RON, it became increasingly clear that California is an important limiting factor for increased octane. Specifically, California's air quality emission regulations limit the ability to increase the octane rating of the base gasoline to achieve more than a 95-RON E10 gasoline standard, and even reaching 95-RON E10 for all gasoline in the state is a steep challenge. Moreover, California regulations prohibit the use of E15. Therefore, using E15 to produce a high octane fuel above 95-RON is not feasible in California. Nor is California alone. Five other states also have limitations or prohibitions on E15 use. Any octane standard that creates a de-facto E15 mandate would prevent the implementation of a single nationwide high octane fuel specification.

Because of these considerations, AFPM concluded that *if* a national octane standard were to take the place of the RFS, a 95-RON performance standard is the optimal level. A 95-RON standard would have several advantages.

A 95-RON octane fuel would enable future optimized vehicles to achieve more than a three percent fuel-efficiency gain, a third of the remaining way toward meeting existing EPA/NHTSA targets that have not been already planned and engineered by the auto industry. It has the potential to be widely available and commercially feasible in the MY2022-25 timeframe, when auto companies need to meet CAFE requirements. It will reduce emissions from the transportation sector at a lower cost than other vehicle technology alternatives. A three percent efficiency gain may seem modest but is substantial. It achieves overall CO2 reduction equivalent to 720,000 battery electric vehicles in the U.S. each year. For context, fewer than 200,000 electric vehicles were sold worldwide in 2016. Importantly, AFPM's analysis concluded that a 95-RON octane gasoline can be produced within current environmental performance requirements.

B. Marketers and Refiners

A fuel-neutral 95-RON octane performance standard benefits the marketing community by maximizing flexibility to achieve the performance standard, compared with higher octane levels. A 95-RON standard would allow retailers to optimize their fuel offering based on available fuel supply and infrastructure compatibility to meet the performance specification with different ethanol formulations up to E15. Consumer-based demand drives technological transformation more effectively and efficiently than command and control policies like the RFS.

For refineries, a 95-RON standard would allow for a more efficient transition than higher octane levels because it would allow for the utilization of existing refinery capacity, distribution, and retail infrastructure on a timeline that can help meet 2022-25 CAFE targets. RON levels greater than 95 would require significant initial investment across the supply chain and a longer time line for implementation. For example, a 95-RON will not require significant refinery investment

during the early transition years. AFPM's analysis indicates that the industry could meet more than half of current gasoline demand with 95-RON before substantial investment at the refinery level is required. Likewise, because 95-RON produced as E10 is similar to fuels on the market today, it would not require significant changes in the bulk transfer and midstream market, and is compatible with underground tankage and other equipment at retail. As previously discussed, 95-RON is already the standard for fuel sold in much of the world, including Europe. Switching from an AKI standard to a RON standard would provide more flexibility for refiners, potentially lowering supply costs.

C. Ethanol Industry

Any discussion about the RFS and octane must involve consideration of the ethanol industry. It is no secret that AFPM opposes the RFS. However, the refining industry also believes that ethanol is a quality product that is competitive with or without the RFS. Under the status quo, the corn ethanol industry has little else to gain. The United States is using ethanol for approximately 10 percent of its gasoline supply—about 14.3 billion gallons in 2017. Despite claims to the contrary, high prices for RINs have not appreciably increased ethanol blending (see figure 4). Market volumes of E15 and E85 continue to be small compared to the vast majority of gasoline that is blended as E10. Biodiesel has become the incremental fuel that is used to meet the conventional biofuel volume standard. There is little reason to believe this dynamic will change substantially in the next five years.

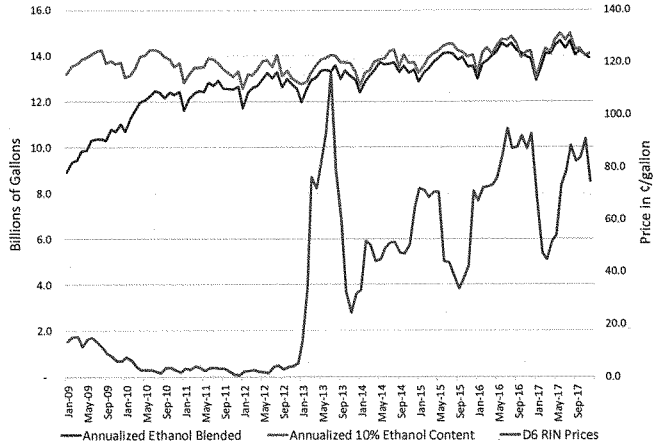


Figure 4 No Correlation Between RIN Prices and Ethanol Consumption

Ethanol is an economic source of octane and as a general matter would be advantaged by a 95-RON standard that increases demand for octane barrels (see figure 5). To achieve full 95-RON across the entire gasoline supply, refiners would need to invest billions of dollars. As a result, as an available and low-cost octane source, ethanol (E15 in particular) could become a market-driven fuel in many markets, as increasing numbers of E15 compatible vehicles enter the fleet and replace legacy vehicles that were not designed for E15 use. Based on our analysis, a 95-RON octane standard would be a more stable policy than the RFS for the ethanol industry, with more upside potential. However, the true value of a fuel-neutral, 95-RON performance standard is that the market will determine the correct balance between refining investments to produce the fuel at E10 or less, or the retail investments needed to produce the fuel at E15.

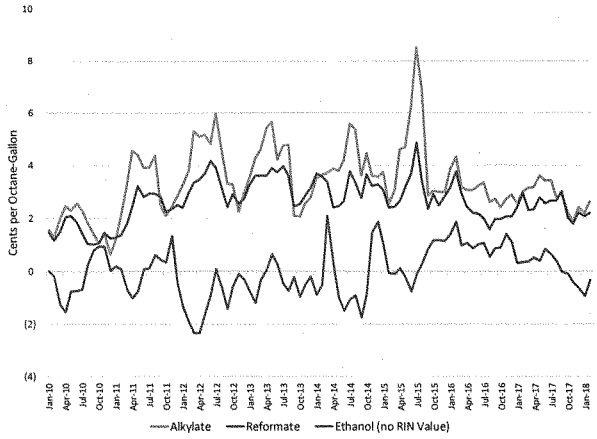


Figure 5: Ethanol is an economic source of octane

III. Challenges with Introducing a 95-RON Gasoline and Other Considerations

AFPM has invested considerable time and energy into better understanding what the refining industry would need to do to meet an increased octane standard. The key area of uncertainty is what needs to happen outside the refinery gate and in the retail market. To ensure the benefits of a higher octane fuel are realized, it is important that Congress consider misfuelling prevention that prevents new, optimized vehicles from using lower-octane fuels. AFPM members own very few retail stations, so the involvement of the retail and marketing industry is critical in these discussions.

AFPM's analysis about the feasibility of producing a higher octane fuel concluded that a new high octane fuel can be produced to meet current environmental requirements around gasoline additives and volatility standards. Policymakers should be aware, however, that increasing octane out of the refinery is likely to increase some stationary source emissions. The increased

greenhouse gas emissions are more than offset by lower emissions from the tailpipe, but permitting issues—most notably in California—may be a challenge. Likewise, regional air quality issues may be challenging. AFPM does not believe these challenges are insurmountable, but it is nevertheless important to understand them.

Most importantly, it is critical to consider the consumer impacts of any policy transition. Compared to business as usual, consumers will likely face lower upfront vehicle costs to meet efficiency standards. However, reducing emissions is not free. Depending on the precise market reaction to meet the performance standard, the refining industry would face billions of dollars in investments to meet a 95-RON standard. However, given the rate at which the vehicle fleet turns over, a full transition to a 95-RON gasoline may take close to 20 years. As a result, the precise consumer impact is difficult to predict.

To minimize the potential impact on consumers, it is critical to allow the market to function as efficiently as possible. To that end, any discussion about an octane standard must include the sunset of the RFS. The RFS is currently a multi-billion dollar per year compliance issue for the refining industry, and much of that capital is spent to purchase RINs for ethanol blended into a E10 fuel that would have been used regardless of the mandate. If the refining industry is to make a multi-billion dollar investment to reduce greenhouse gas emissions from the sector, it is critical that Congress streamline fuel regulations to make it more tenable.

Conclusion

AFPM recognizes that there are many questions that need to be addressed before any stakeholder, including AFPM, or policymaker fully embraces the concept of a transition from the RFS to a 95-RON octane standard. This includes considering questions about the

implementation, transition, and misfuelling mitigation. However, AFPM believes there is enough potential benefit to consumers and all stakeholders with an octane standard to merit discussion about these issues, but only within an overall conversation about RFS sunset.

A 95-RON octane standard could enable more efficient engines, promote competition among various fuel technologies, and is feasible nationwide in a shorter timeframe than higher RON standards. It is critical that any octane standard is fuel neutral to facilitate maximum flexibility in meeting the standard. AFPM cannot and will not support an octane standard layered on top of the existing RFS and will not support any octane standard exceeding 95-RON. Finally, recognizing that a full transition to a new fuel could take many years, policymakers should consider ways to minimize potential consumer impacts during the transition period.

AFPM appreciates the Committee's efforts to work with stakeholders to identify good policies to solve our nation's fuels and vehicle challenges. This work could not come at a more crucial time. Fuel economy standards are being reviewed, RFS compliance costs are threatening good paying jobs, and the RFS is careening toward a future with no statutory guardrails. Now is the time to bring together consumers, refiners, biofuel producers, marketers, and the auto industry to find policies that work better for consumers and all stakeholders. AFPM is committed to continue working with you to find solutions and appreciates your leadership.

Summary Testimony of Chet Thompson, President and CEO, American Fuel & Petrochemical Manufacturers

High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities

AFPM believes that there is potential for a transition from the Renewable Fuel Standard ("RFS") to a fuel-neutral, 95-RON octane performance standard that could better address the needs of all stakeholders: the auto industry, marketers, biofuel producers, refiners, and most importantly consumers. But given the enormity of the investments that would be required of the refining industry, implementing a 95-RON octane performance standard could only be done in lieu of—not in addition to—the RFS.

The introduction of a high-octane fuel would raise many challenges and thus is not something that the refining industry takes lightly or is ready to fully endorse at this point. Nevertheless, the refining industry sees enough potential in the concept to further explore it as part of more rational and harmonized fuel and vehicle policies. Existing policies intended to improve the fuel economy of the transportation fleet, increase energy security and support U.S. farm communities are simply not working as intended.

U.S. automakers are struggling to develop economically viable strategies for complying with increasingly stringent fuel economy standards, while still producing vehicles that comport with consumer preferences. They are forced to manufacture vehicles that consumers do not want or are too expensive for most to afford. They are caught in the middle of overlapping and competing authorities that make one national program difficult.

The RFS is not working as originally intended either. Although corn ethanol and biodiesel production have increased over the last decade, they have done so at great expense to consumers and the U.S. refining industry. Renewable Identification Number ("RIN") prices have skyrocketed as the United States approached and hit the E10 blendwall. For most refiners, RFS compliance costs now dwarf many other expenses, threatening the long-term viability of many. The program is riddled with uncertainties, inefficiencies, and fraud. Uncertainties will continue to grow as we move closer to the transition of the program to the full discretion of EPA after 2022. The conventional ethanol industry cannot extract much more out of the RFS. It has already achieved its maximum mandate of 15 billion gallons and its mandated volumes can only go down at this point. The ethanol industry must look to other avenues to grow its market share.

This is where high octane fuels come in. If done correctly—through free market principles, the sunsetting of the RFS, and implemented over a reasonable phase-in period—higher octane fuels could benefit the auto industry, biofuel producers, fuel marketers, refiners, and most importantly, consumers. Higher octane fuel, specifically 95-RON, would help auto companies improve the efficiency of the internal combustion engine and comply with fuel efficiency standards. It would provide the biofuel industry with the opportunity to expand its market share. It would end the RFS for refiners and provide product flexibility for the marketers. And it would benefit consumers by creating a transparent and competitive market for all liquid fuels to compete.

Mr. SHIMKUS. Thank you very much. I appreciate everybody's testimony.

To my colleagues on the subcommittee, welcome to my world. I believe that we are closer than people think. And I want to encourage my colleagues to really help now dig into this issue specifically so we can address and work through some of these concerns.

Having said that, I would like to recognize myself 5 minutes for my first round of questions.

For all you all—that is what we say in southern Illinois, "all you all"—this hearing is more about the high-octane concept overall and less about debating the specifics, such as where that number should be set. So without advocating for a specific number, can each of you sketch out what you need in order for high-octane fuels to work for you and your member companies?

Tim.

Mr. COLUMBUS. We believe there are a couple things that we would have to have. Number one, we would have to have a regulatory regime that guaranteed retailers who complied with warnings, signage standards, that if a motorist introduced the wrong fuel into his new vehicle the Environmental Protection Agency would not be holding the retailer accountable for that.

When we went from leaded to unleaded gasoline retailers were prosecuted by EPA if consumers put leaded gasoline in a vehicle meant for unleaded. That has got to change for us.

Number two, we would think it would be crucial that the one-pound waiver Reid vapor pressure requirements afforded E10 be extended to any blend of fuels that has an RVP equal to or less than E10.

And finally—and others can speak to this as well—I would hope that you could do something to accelerate the approval process for new gasolines. I think it took 3 years to do E15. If we are going to go to higher blends—and I anticipate that over time we would go to higher blends than just E10, E15—I think the market will end up demanding more than 95 RON. Ninety-five 95 RON is a floor for us, not a cap.

Mr. SHIMKUS. Ms. Skor.

Ms. SKOR. Thank you. I would have to echo much of what Mr. Columbus said in that, yes, first and foremost, the ability to sell a legal fuel such as E15 year-round and any blends above 10 percent year-round is going to be absolutely paramount because you look at that today, and that is really the largest impediment to much further market adoption of E15.

I would second that the approval process of new fuels has been very slow and cumbersome, so that, too, is something that you would want to see expedited, again in continuance of this quest for a free market and access to the consumer in the marketplace.

And importantly, any discussion of high octane—and I appreciate how much ethanol is recognized as the cheapest octane source on the planet. Having said that, if you look at the last decade of market behavior and dynamics, refiners do walk away from that economic source of octane due to competition. And so we would like to see and we would need to see that there is a designation that that high-octane source is renewable fuels as the source of octane.

Mr. SHIMKUS. Mr. Nicholson.

Mr. NICHOLSON. We need one national standard for the fuel. That is important to us. And we would like to be part of making sure the specifications are correct and that it is interrelated with emissions criteria. But one national standard, I think, is what we are seeking.

Mr. SHIMKUS. Mr. Jeschke.

Mr. JESCHKE. Well, as a supplier of the raw materials for ethanol, corn farmers are ready to do their part. We have got piles of corn all over this country right now on the ground yet. That is how much of a surplus of that commodity we have. Those are being picked up now.

But, again, the raw material that we are providing can easily be geared up. What we are growing naturally yields about 1 percent a year, and so I think we can do our part.

Mr. SHIMKUS. Mr. Thompson.

Mr. THOMPSON. We need the RFS to sunset. We cannot do both high-octane fuel and the RFS.

Mr. SHIMKUS. Great. Thanks.

For Growth and the corn growers, would you support any level of stringency that gives you at least as much ethanol that you currently use today?

Ms. SKOR. So I think if the conversation is simply high-octane standards, that is a wonderful thing that we should be moving toward as a country. If the conversation is a high-octane standard coupled with some change to the RFS, that is a different conversation.

If you look at the market potential that is the congressional intent of the RFS, 90 percent of our market access is yet to come, and that is on the advanced side. So importantly, one of the things that we get that we have provided with the market access of the Renewable Fuel Standard is that innovation and that drive toward use of——

Mr. SHIMKUS. My time is about ready to expire, and I want Mr. Jeschke to get a chance to answer. But you didn't answer the question on stringency.

So, Mr. Jeschke.

Mr. JESCHKE. We are wanting to grow the market. Again, I talked about the piles of corn we have. So we are wanting to grow our share of the fuel market ethanol production. We think it is good for farmers and good for the environment.

Mr. SHIMKUS. Great. Thank you very much.

The Chair now recognizes the ranking member of the subcommittee, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you.

Mr. Thompson, if the RFS is replaced with the high-octane standard, as you suggest, it is my understanding that there are other petrochemical-derived chemicals that could be blended into gasoline to achieve the octane rating of premium fuel. Is that correct?

Mr. THOMPSON. Yes, that is correct. Gasoline is a blend, and there are lots of blends that have octane in it. But our analysis shows, if we went to a 95 RON standard, ethanol would continue to be the dominant source of octane.

Mr. TONKO. Right. OK. But some refineries might choose to meet the octane standard with an additive other than ethanol. Would that be an option in the absence of the RFS program's mandate or some other requirement to blend renewable fuel with gasoline?

Mr. THOMPSON. Certainly that would be an option provided it can be done consistent with air quality and their local permitting, which absolutely our modeling shows that there would be no environmental detriment due to other sources of octane being used.

Mr. TONKO. Thank you.

I would point out that, when Congress mandated a performance standard to increase the oxygenate content, the industry used MTBE to achieve this standard, and we ended up with a terrible drinking water pollution problem. So before we open the door to increased blending with other additives, I would like to know what risks might be involved in making that decision.

Ms. Skor, the RFS program was intended to reduce petroleum use and to increase the use of renewable fuels. If renewable fuels are no longer specified and we replace the RFS with a high-octane standard set at 95 RON levels, what is the impact on the overall demand for renewable fuel?

Ms. SKOR. Well, there would be no impact on the overall demand. I mean, as has been stated by the other panelists, a 95 RON is a 91 premium fuel. It is currently sold on the marketplace, often with a 10 percent ethanol blend. So if we move to a national standard of 91 there would be little to no incentive to further use biofuels in our national transportation mix.

Mr. TONKO. So what might this mean for the development of advanced biofuels and for the transition to greater use of cellulosic biofuels?

Ms. SKOR. Well this would eviscerate really all of the innovation and investment that has taken place so far, if you look at advanced biofuels. Just a few years ago, when the RFS blending targets were put on hold, we as a Nation lost billions of investments in next-generation technology because of the lack of certainty that these fuels that I will say contribute 90-plus percent greenhouse gas reduction—the uncertainty that there would be no market for them in the U.S.

Mr. TONKO. As we have discussed, the Department of Energy, in collaboration with vehicle manufacturers, has been exploring the optimal combination of high-octane fuels with advanced high-compression engines, the Co-Optima study. My understanding is the octane levels they are working with are 95 or 96 octane or 100 RON, and that the source of octane is presumed to be renewable fuels at blends that are E25 to perhaps E30. Is that correct, Ms. Skor?

Ms. SKOR. Yes, that is correct. And that program is similar to a large body of work that is examining the sweet spot, if you will, in an E20 to an E30 blend where you are optimizing the cost savings for consumers coupled with that 90 percent greenhouse gas reduction that you are going to be getting—or excuse me, the greater greenhouse gas reduction—and the reduced tailpipe emissions.

Mr. TONKO. Thank you.

And, Mr. Columbus, you and I have discussed that, when it comes to fuels, there is one thing consumers care about above all else, and that is the price.

Mr. COLUMBUS. Yes, sir.

Mr. TONKO. I imagine during the transition to a 95 RON fuel standard there will be some new vehicles that will require something similar to today's premium fuel and many existing vehicles which continue to opt for the cheapest option. How do you envision consumer acceptance of a requirement to buy more expensive fuel?

Mr. COLUMBUS. Well, first of all, let's talk about premium gasoline prices today as opposed to regular-grade gasoline. It is a specialty product, Mr. Tonko. It is like going someplace and trying to get ethanol-free gasoline. People pay a premium for it because there is very narrow demand for it today.

Having said that, I envision that a 95 RON, if it is coupled with a waiver of the one-pound waiver for higher blends of ethanol, you are going to see prices come down on that product. Why? Because ethanol is, in fact, the cheapest product.

Something I want you to always remember, Mr. Thompson's members are important to us, but they are not the only source of blend stocks on the face of the earth. If, in fact, there are cheaper forms of blend stock, my clients will do so. Many of them today have introduced E15. Why? Because it is cheaper in the retail market because of the ethanol component. So that ability to use increased amounts.

There is, however, a cap on that, and that is you have to have an infrastructure that will handle it, sir. And today EPA's rules say if it is not certified to hold a higher blend than E10, not warranted, and a retailer cannot affirmatively demonstrate that that equipment is compatible, and it goes back to the MTBE stuff, he has violated the Resource Conservation Recovery Act. So prices will come down because component prices will come down.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the chairman of the full committee, Mr. Walden.

Mr. WALDEN. Thank you very much, Mr. Chairman. And I very much appreciate your willingness to chair this subcommittee and take on this issue. I know how much fun it must be for you being conflicted with all these things. But you are doing a great job, and we appreciate it.

To everybody on the panel, in one capacity or another you are all involved in the Renewable Fuel Standard or you wouldn't be before us today. Can I get you all to agree that a high-octane fuel standard, if done right, could be an improvement over the status quo? And that is a pretty easy yes or no. Start at that end.

Mr. COLUMBUS. Yes.

Ms. SKOR. A high-octane standard, provided that you couple that with the market access and the drive toward growth that you get with a Renewable Fuel Standard.

Mr. WALDEN. So I just want to make sure we are answering the same question. Can you agree that a high-octane fuel standard, if done correctly, could be an improvement over the status quo, yes or no?

Ms. SKOR. Possibly.

Mr. WALDEN. OK.
Mr. NICHOLSON. Absolutely, yes.
Mr. WALDEN. Thank you.
Mr. JESCHKE. I will take a chance and say yes.
Mr. WALDEN. OK.
Mr. THOMPSON. Yes, sir.
Mr. WALDEN. Thank you.

Mr. Columbus, the gas station is where the fuel policy either succeeds or fails, because that is the interface with the consumer, and you have done a good job of representing the consumers here. On balance, do you see a high-octane fuel standard potentially working for the benefit of the consumer?

Mr. COLUMBUS. I do, sir.
Mr. WALDEN. All right.

Ms. Skor, one of the exciting things about the high-octane fuel standard—well, our version of it—is that it allows us to take full advantage of ethanol's properties as an octane enhancer. Would you agree that such a policy could lead to a more advantageous use of ethanol?

Ms. SKOR. I think the 95 RON policy discussed right now will not necessarily lead to a more advantageous use of biofuel for consumers.

Mr. WALDEN. You know, I was on this committee—there are a few of us left that were in '05, '06, '07. The energy situation we faced then is much different than it is today. That was an era of scarcity. We were watching what was going on in Brazil with ethanol. I mean, it was a different world.

And I supported the RFS then, and I have worked on it, and I have got a little bit of that. And I think there is a difference, by the way, between corn ethanol and the advance in cellulosic, and you mentioned that in your comments.

I was in the radio business for 21 years. I would have loved to have had a mandate that somebody has to buy my inventory. I am just saying. I grew up on a farm, I get it. I am an orchardist. I respect corn growers.

But as the chairman of this committee, I have this advantage of looking at this broadly and trying to figure out what is the best policy for American farmers, what is the best policy for consumers, and how do we move this policy forward in knowing that 2022 is out there?

Now, some people I know may want to just roll the dice and go, "We will see, we will just ride it, see what happens." I don't think that is the responsibility of Congress. I think our job is to set the policy as we did in '05–'07 to try and resolve a problem then. I think it is time to modernize that policy.

And I just want people at the table to understand we are serious about this, one way or the other, and we want to get it right for the American consumer so it is sustainable, predictable, and we continue to make progress to reduce harmful emissions, we continue to help our farmers, but we also put the consumer first. The consumer first.

And so I struggle with this. This is a hard one for all of us. And we know the realities of the Senate. We know the realities in getting votes around here. I understand all the market forces, political

market forces, at work. I am not naive to that. But I think we have a big responsibility to the country here to do this right.

And so, I don't know if I have got any more questions on it. I appreciate you all being here. I know you are all looking at this seriously. I just want to implore that we continue these discussions, because I think there is a path forward that will work for our growers wherever ethanol is being produced, grown, and that can work for the consumers and give the stability.

And I want to thank the autos for coming to the table, because we want to make sure we are not jamming something that will not work for engines. And I would defer to you about that, that issue.

If we do this right, you will create demand for this higher octane, right? It will be predictable.

Mr. NICHOLSON. Yes, we are very happy about this. This is the most cost-effective way to increase fuel economy and reduce greenhouse gases. And so we are really happy to have the hearings and to move this forward as quickly as possible.

Mr. WALDEN. And, Mr. Thompson, from your perspective, are there issues in other States that could be adversely affected if we get the number wrong?

Mr. THOMPSON. Absolutely. So, again, we can talk conceptually about E20, E30, but if we put it in the context of what we are trying to do is address CAFE in the near term, 95 RON is the only product that can be sold nationwide. California and five other States do not allow the sale of E15 or higher octane blends.

So how could we put the autos in a position of rolling out a new product but not be able to get fuel to them? Ninety-five RON is the only product that is scalable within the timeframe of CAFE compliance.

Mr. WALDEN. I know I have exceeded my time. Thank you, Mr. Chairman, for your leadership on this.

And, again, to everybody on the panel, we know you are serious about it. We appreciate your working with us.

And I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the gentleman from Texas, Mr. Green, for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman, for having this hearing, although I would at least ask for one more refiner on there to match up with the corn folks here.

I want to follow up what the Chair said, that 2005, '06, '07, and '08, this subcommittee had a hearing in 2008 on peak oil. Obviously, it has changed to 2018.

Mr. Columbus, your members actually typically sell what we call regular gas and premium gas.

Mr. COLUMBUS. Yes, sir.

Mr. GREEN. What is the percentage right now that you are selling of premium?

Mr. COLUMBUS. Under 20.

Mr. GREEN. Under 20 percent?

Mr. COLUMBUS. Somewhere around 15. Well, yes, I am not even sure premium. Regular-grade gasoline is something north of 70 percent, sir, midgrade 89 octane. Premium gasoline is probably 10 to 12 percent.

Mr. GREEN. Well, most of our vehicles on the road today are made for running very efficiently at regular gas. And if we do it, and maybe the manufacturers will do it, so if we end up going to 95 percent, you are going to increase the cost at the pump for people running their vehicles.

Mr. COLUMBUS. All right. Number one, perhaps initially it is not clear to me, sir, that on a long-term that is going to work. The reason E15 has entered markets where it is lawful is it is offered at a price which is less than regular-grade gasoline.

Mr. GREEN. Not in my area in Houston. Very often we don't have a whole lot of——

Mr. COLUMBUS. Well, not at all.

Mr. SHIMKUS. Everything is bigger in Texas.

Mr. GREEN. That is right.

But that is one of my concerns. And I am glad the manufacturers are here, because they make the vehicles. And our fleets turn over fairly regularly, so people may not notice it. But by doing this, you will require that people pay more at the pump, which is not a popular issue. And you are a marketer. You are not the one.

Mr. COLUMBUS. No. Again, sir, I believe experience shows us that, if there is an absolute demand for a product, the price of it tends to go down. This is a 7 percent shift in vehicles every year. As that product comes in, I don't doubt that at first it will be priced higher than regular-grade gasoline simply because it will still be a specialty product.

As you evolve, as you transform the market, that price will come down. And, again, if you give me the one-pound waiver on higher blends and give me time to redo the infrastructure to tolerate them, I suggest that you will find that that price becomes very competitive and looks a lot like what regular gasoline or less than regular gasoline would cost today.

Mr. GREEN. Well, my concern is right now that if we change the fleet over the period of years, people are going to pay more at the pump. And right now I am hearing people, even in Houston, complaining that the price is going up, because we are going to a summer blend in Texas, and that is more expensive to refine. So that is one of the concerns.

I was on the committee in 2005, and I want to thank our former chairman, Joe Barton, who was here a minute ago, who was the chair of the committee. We did a really good energy bill. And a lot of my environmentalists forget that that bill also authorized the wind power, the solar power, and what we have done on our electricity generation.

But the RFS I considered was a failure, because here we are 13 years later. And I have one relatively small biofuel refinery in my district. We used to have three, but they couldn't go with the market over the last number of years.

But when we talk about biofuels, what percentage is corn-based, Ms. Skor, corn-based as compared to what some of us thought back in 2005, it would be cellulosic, we would be recycling things, instead of making the price of our corn whiskey go up?

Ms. SKOR. Right now the vast majority is blended with corn ethanol, so conventional ethanol.

We do have advanced cellulosic ethanol on the market. And I would say that, if you look at the progress that has been made in the 10 years, one of the things that has slowed our ability to innovate and get more cellulosic to the market was the implementation of the RFS and the uncertainty in terms of what was taking place at EPA.

That uncertainty sends the wrong market signal to innovators and investors. And so it is with stable policy that we will get more.

Mr. GREEN. I only have a few more seconds. And I agree, because in my area in Texas we were reformulating our gas in the 1990s, early 1990s, and it was an environmental benefit. But we used MTBE, a product of natural gas. But the 2005 energy bill, the House bill, actually had a waiver there for those producers of MTBE, but the Senate didn't accept it.

We are still producing MTBE in Texas for export market, but we can't use to it reformulate our gas. And now we have lots of natural gas that we could be using that for.

Mr. Chairman, I know you and I have this battle for a number of years.

Mr. SHIMKUS. Welcome to my world.

Mr. GREEN. I would like to reform the RFS, but I am not so sure this is the way it needs to be reformed.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the other gentleman from Texas, in a bipartisan manner, the gentleman, Congressman Barton, for 5 minutes.

Mr. BARTON. Thank you, Mr. Chairman. And I am here under protest. I don't do getaway hearings, and I darned sure don't do hearings that start at 9 in the morning.

Fortunately, we have a witness that represents one of the companies that is one of the biggest employers in my district. General Motors has an assembly plant in Arlington, Texas, that is one of the most successful plants in their company. And so I am honored to be at this hearing because of that.

I listened to Chairman Walden, and I will say, the country is well served that he is the chairman right now. If I were still chairman, I would be in a wrestling match with Chairman Shimkus because I would be repealing the Renewable Fuel Standard and I would take a go at repealing the Corporate Fuel Economy standard.

I was chairman in 2005, and we have the RFS, the original RFS, because the Speaker of the House was Denny Hastert from Illinois. And he said, "We are not going to have a debate about this, Joe. You are chairman, but I am Speaker." And that was pretty determinative. I mean, I said, "Yes, sir, Mr. Speaker." But it was a more lenient RFS, I think a more reasonable RFS.

So there is no question that it is important to our corn growers, our agricultural sector. But at the same time, nobody can say ethanol is a struggling startup industry anymore. So you don't really need all the protection, the mandates, the quotas that we have today. So this high-octane alternative, I think, is a very reasonable proposal. I really do.

So I guess my question to Mr. Nicholson would be, Is there any doubt that the manufacturers can manufacture engines to use that type of fuel?

Mr. NICHOLSON. There is no doubt. We are at the table. I am representing U.S. CAR, and we are all prepared to do our part to redesign the engines at great expense and great investment in order to deliver this roughly 3 percent fuel economy improvement from the 95 RON. It is very important. And we think it is a consumer-facing way that consumers will get benefit from and we will get reduced greenhouse gases. So we are here and ready to support.

Mr. BARTON. And I guess—is it Skor, is that how you say it? You seem to be the proponent of the ethanol industry.

Ms. SKOR. Yes, I am.

Mr. BARTON. Is there any doubt in your mind that the group that you represent, that if we were to move to allowing a high-octane fuel, that your industry still wouldn't thrive?

Ms. SKOR. You know, honestly, we wish that we could because of all of the reasons, the benefits of ethanol as high-octane and homegrown renewable fuel.

The challenge, and the reason that we believe we continue to need the guardrails provided by something like the Renewable Fuel Standard is it is not an open marketplace. We don't have access to the consumer. And until there is a marketplace where we can——

Mr. BARTON. What do you mean by that? What do you mean you don't have access to the consumer?

Ms. SKOR. If you look at the fuel marketplace, so much of the access to the——

Mr. BARTON. You have guaranteed access.

Ms. SKOR. Yes, with the Renewable Fuel Standard now we do have the ability to compete. And what we would want to see in conversations moving forward is, what is the path for continued access to the consumer?

Mr. BARTON. Well, I am going to give back a minute, Mr. Chairman. I do appreciate you holding the hearing. I will yield to Mr. Flores, if you want my last minute.

Mr. FLORES. That is OK, Mr. Chairman, because I have got a ton of questions. This is a great panel.

One of the things I am hearing is that everybody agrees we need to have a higher octane standard, right? OK.

The second thing, the questions I am hearing are: How much? How high should that go? How do we get there?

And then the third thing I am hearing is, How long should we spend to go from where we are today to go to that new standard, so that not only can the ethanol industry and the retailers and the auto manufacturers and the refiners get ready for that, but also get our consumers educated and ready for this new world of higher RON?

I only have a few seconds left, so I will wait and use that as my intro for the next round. But it does sound like it is a win-win-win for the environment, for our consumers, for the ethanol markets, including advanced and cellulosic conventional for our marketers and retailers, and also for our refiners and auto manufacturers. It sounds to me like everybody wins. So I think we need to look at that versus status quo, which is clearly a loser.

I yield back.

Mr. SHIMKUS. The gentleman's time has expired.

We are going to have votes pretty soon. I plan to come back, Mr. Tonko is going to come back, so that we can finish our questions and maybe go to a second round for those who want to delve back in this.

The Chair now recognizes the gentleman from California, Mr. McNerney, for 5 minutes.

Mr. MCNERNEY. OK. Well, I appreciate the chairman jumping over to me. And I appreciate the panelists here this morning.

Mr. Nicholson, I am very concerned about the Trump administration's proposal to roll back greenhouse gas and fuel economy standards for model years 2022 to 2025 automobiles and light trucks. My State of California is committed to reducing tailpipe emissions and getting vehicles on the market that use less fuel and emit less carbon per vehicle mile traveled.

So given that backdrop, I would like to know where GM stands on EPA Administrator Scott Pruitt's recent statement in opposition to California's ability to set greenhouse gas emission standards for automobiles under the Clean Air Act.

So does GM agree with Administrator Pruitt's opposition to the California waiver?

Mr. NICHOLSON. Can you ask the last part of the question again?

Mr. MCNERNEY. Sure. Does GM agree with Administrator Pruitt's opposition to the California waiver?

Mr. NICHOLSON. So that is not a question about the midterm review or——

Mr. MCNERNEY. That is right. It is a question about your agreement with——

Mr. NICHOLSON. Yes, I am not really prepared to give General Motors' point of view on that question. I am in global propulsion systems and product development, and we are here to talk about octane and engines. And I am not really informed about the waiver or whether that is OK or not OK.

Mr. MCNERNEY. Well, this is an important question, especially to California, but to the Nation in general. If the automakers understand, in my opinion, that the high fuel efficiency standards are in their interest in the international auto market, then they should be in opposition to this potential opposition.

Mr. NICHOLSON. We do have a prepared statement on the midterm review, and I would be happy to share that with the committee.

Mr. MCNERNEY. All right.

Ms. Skor, Mr. Thompson has proposed replacing the Renewable Fuel Standard with 95 RON octane performance standards. However, if the octane is not sourced from ethanol, wouldn't this just lead to an increased oil use?

Ms. SKOR. Potentially. Ninety-five RON is a 91 octane fuel. That is the premium fuel on the market today. There is every opportunity, in many instances, for refiners to make that premium fuel with more ethanol, and yet, they are not doing it, even with the economic incentive of ethanol as the lowest octane. So 95 RON, at best it is status quo, and perhaps you will be using less ethanol than today.

Mr. MCNERNEY. Thank you.

It wasn't that long ago that we were hearing about E15 causing damage in engines. We had a Briggs & Stratton in here, some of the auto manufacturers were concerned about that.

Is that still a concern about E15 damaging engines and causing long-term damage?

Ms. SKOR. Is that a question for me?

Mr. MCNERNEY. You can answer it if you want.

Ms. SKOR. Well, I will defer to the auto. But I will say, kind of, I will provide part of an answer. E15 is approved for 9 out of 10 vehicles on the road today. And so, in fact, I applaud GM for being the first company to warranty E15 when it became a legal fuel.

So it is not approved for small engines. So all of the retailers who sell E15 also sell E10. Some also sell an E0.

We did a survey with consumers who own motorcycles and small engines last year and asked them, "Are you satisfied with the fuel choices on the market? Do you believe that you are using the right fuel for your engine?" And the resounding response across the board was yes.

Mr. MCNERNEY. Go ahead.

Mr. NICHOLSON. I can confirm that answer. So for U.S. CAR, E15 is fine. We have been that way since 2012. But there are lots of people filling up at the pump with all kinds of small engines that have different answers. But for U.S. CAR, E15 is fine.

Mr. MCNERNEY. How far do you think we can go with ethanol in our cars, in most cars out there today?

Mr. NICHOLSON. Well, E15 is where we are at today. It would require redesign of fuel systems. You have to actually look at every single part that touches the fuel in the car to go higher.

So we are not prepared to really talk about anything higher today. It may be technically possible. But for today, E15 is what is OK.

Mr. MCNERNEY. OK. Thank you. I yield back.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the vice chair of the subcommittee, Mr. McKinley, for 5 minutes.

Mr. MCKINLEY. Thank you, Mr. Chairman.

I am just curious from your testimony. I was just Googling the Federal Trade Commission, their website, and their consumer division within ftc.gov says that higher octane gasoline offers absolutely no benefits, it won't make your car perform better, go faster, or get better mileage, or run cleaner.

I am trying to reconcile that with all the testimony we have been hearing and all this debate. So who is right? The Federal Trade Commission?

If it is not going to run cleaner, better, not going to improve our quality of our cars, are we doing this just to redesign our engines? Because I assume that is what we are going to have to do, because typically our engines today aren't designed to run on higher.

So I am trying to reconcile what we are doing here.

Mr. NICHOLSON. Yes, I can reconcile that. It is a true statement that, if your entire vehicle, including the engine and the way it is calibrated, is designed for 87 AKI pump fuel, regular fuel today, that putting premium in it will provide no additional benefit.

What we are talking about is something very different, a coordinated fuels-and-engines-together-as-a-system approach in the future. And if we redesign the engines to take full advantage of the higher octane and we calibrate them accordingly and introduce them in the market, then we can get this 3 percent benefit that we are talking about.

Mr. MCKINLEY. And the cost of retooling, what can we expect that that would add to the cost of the car, let alone the cost of the fuel when we have to change our engines entirely, our whole fleet? I am just curious about this.

Mr. NICHOLSON. It is very costly. In fact, if we implement this system, OEMs, such as General Motors and Ford, FCA and others, would actually be investing billions of dollars to redesign engines, remanufacture them at higher compression ratios to accommodate this fuel.

The fact that we are willing to do that and that we believe this is cost effective relative to other greenhouse gas and CAFE improvements shows you how serious we are.

Mr. MCKINLEY. If I could please, but you are going to pass that cost on, right? I mean, that is what happens.

Mr. NICHOLSON. Well, we don't believe—I mean, we are facing regulations for greenhouse gas and CAFE.

Mr. MCKINLEY. I understand that, but the billions of dollars is going to be passed on to the consumer, right?

Mr. NICHOLSON. But this is the most cost-effective thing that we can do. Other things we will have to do will cost even more.

Mr. MCKINLEY. We will have to have more of a conversation about this.

Let me—the last question, because I want to digest that answer.

The other question has to do with, before I came to Congress, apparently there was a move to go with flex fuels. And we experimented. Congress must have passed that. What have we learned? What have we learned from the flex fuel experiment in trying to improve the RFS?

Mr. NICHOLSON. Fuels and engines are a system, and that is the most important message. It takes all the stakeholders working together to ensure success. And to me, that is really the lessons learned. We all need to go together, and we need a framework and a policy that really support that to makes things happen.

Mr. MCKINLEY. Has it failed? The flex fuel system experiment, did it fail?

Mr. NICHOLSON. I think everybody can judge that for themselves.

Mr. MCKINLEY. How would you judge it?

Mr. NICHOLSON. I wasn't here at the time when it was passed.

Mr. MCKINLEY. No, right now, today. Has it worked? Was it a good investment?

Mr. NICHOLSON. I don't really have an opinion on that.

Mr. MCKINLEY. Anyone else want to comment on the flex fuel experiment?

Mr. COLUMBUS. It didn't work.

Mr. MCKINLEY. It did not?

Mr. COLUMBUS. It did not work.

Mr. MCKINLEY. Thank you.

Mr. COLUMBUS. Well, no. Some of my members created the most expensive parking lot and parking spaces of any convenience store in history.

First, most people didn't know that they had a flex fuel vehicle, as surprising as that might be. Number two, taking E85 to market proved to be a disaster. People didn't understand it. They worried that they weren't getting the same value, even if you had to price it substantially below regular gasoline. And you had to charge 50 to 70 cents per gallon less to have people buy it. So, no, it didn't work.

I contrast that to what we have talked about today.

Mr. MCKINLEY. Anyone else want to comment about that?

Ms. SKOR. I would offer, one of the important learnings from that experience that we have acted on—there is actually Government, public-private partnership on building out the infrastructure—is that one of the things that you needed to make sure is that consumers had access to the fuel so that they could optimize the flex fuel engines.

So one of the things that the biofuels industry has made a concerted effort to do since then is work with the retailers to build out the infrastructure for higher blends so that, when we have higher blends come available, consumers can access them in the marketplace.

Mr. MCKINLEY. Mr. Chairman, I yield back my time.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the gentleman from Ohio, Mr. Johnson, for 5 minutes.

Mr. JOHNSON. Thank you, Mr. Chairman. I appreciate it.

Important topic, especially in a large agricultural region and energy region that I represent in eastern and southeastern Ohio.

Mr. Columbus, do you envision any problems for stations continuing to carry today's fuels for existing vehicles while also introducing a new high-octane fuel? I mean, would the transition be a smooth one?

Mr. COLUMBUS. I do not, sir. Today we have—almost every retail outlet in the United States sells a premium grade of gasoline, at least has one offer for that. That is a 95 RON product.

As we go forward and we want to introduce and make the price of those gasolines go down, we will need to add, I believe, more ethanol, and that will drive the price of that product down from where it is today. Today it is a specialty product, and it is priced highly.

Mr. JOHNSON. OK. Do you envision gas stations in some parts of the country meeting a high-octane standard with more ethanol, and perhaps stations in other parts of the country with relatively less?

Mr. COLUMBUS. Yes, sir. I think what you are going to see—first of all, I want to remind everybody, demand pulls supply. "If you build it, they will come" only worked for Kevin Costner, and that was a movie. So we are going to sell what the people want.

In some parts of the country, they want lower ethanol mixes. I don't know why. I mean, if you go to Mr. Cramer's part of the world today, you can go get E0 for 60 cents a gallon more than you can buy regular grade 10 percent ethanol. I don't know why people want to do that.

But if the demand is there for lower amounts of ethanol, it will get served that way. But on a cost basis, I think you will find that higher ethanol blends will be very attractive.

Mr. JOHNSON. OK. Well, thank you.

Mr. Thompson, what kinds of facility changes would refineries need to undertake to start producing high-octane fuels or blend stocks for high-octane fuels? How much would they cost?

Mr. THOMPSON. Well, it depends upon whether the program is phased in. So, in our world, in order to do this properly, the RFS would continue and then phase out, sunset. But on the early years of the transition, it would cost our facilities very little because we can now produce 95 RON at the moment, and we believe we could make enough to coincide with the introduction of the new vehicles.

Over time, it would probably cost multiple tens of billions of dollars of investment to generate new sources of octane, the ability for us to generate that, and also the new BOBs that would have to go along for higher levels of octane.

So this would not be cheap for us. And to a point that was made earlier, we are here not in a void, or a vacuum, we are here offering up a compromise solution to bad status quo, which is how do we help the autos comply with CAFE and how do we make the RFS better? We are willing to make that investment, because at the end of the day, it is cheaper for consumers.

Mr. JOHNSON. Gotcha. OK.

Mr. Jeschke, how much fuel ethanol use do you expect this year and the years ahead under the current RFS? And how much more could a high-octane standard provide?

Mr. JESCHKE. We are going to use somewhere 14-plus billion gallons this year, but we would hope to grow that because of increased blending, as Ms. Skor has pointed out many times here. But it all depends on what this group, what this body comes up with for the rules and regs following. I guess I am skeptical, as Ms. Skor is also, that the petroleum refiners will use more ethanol voluntarily.

Now, as a farmer, as a proponent of ethanol, as a person that has used it in my vehicle since the 1970s—and by the way, I have a Briggs & Stratton engine that we bought in 1975 on a rototiller that has had E10 in it ever since we bought it, and I guarantee it will start on the second pull every spring. So these small engines can run on ethanol, the old ones, even, that weren't approved for it.

But we need to grow that market for us to be able to expand our corn operation. I am getting the same price when I started farming. Corn was in the mid-$3. Gasoline was 40 cents then in the mid-1970s. Today, gasoline is $2.50 a gallon, and I am still getting in the mid-$3 for my corn.

So dynamics, I am very, very vested in ethanol and trying to promote expanded use. So that is why I very, very much want to see increased blending, not the status quo.

Mr. JOHNSON. OK.

Very quickly, Mr. Thompson, you wanted to make a point?

Mr. THOMPSON. Yes, I would like to just add, because it has been referenced a few times that we are not using all the ethanol. We are using every drop we can use. There is a blend wall here. We

are using as much ethanol as our existing auto fleet can handle. There is no place else for it to go.

And with all due respect to Ms. Skor, she is a wonderful advocate for her client, it is not accurate that 9 out of 10 cars can handle E15.

The gentleman from California, we can't even sell E15 in his State, OK, by law. Most cars today are not warranted to run on anything higher than E10. It is a fact.

Mr. JOHNSON. Mr. Chairman, I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

We are going to go to Bill Flores for 5 minutes, then we will recess, because I think votes were just called.

And I want to thank Congressman Flores. He has been an ally and a friend working on this together, so I want to give him a lot credit for that.

Mr. FLORES. Thank you. We come at this from different angles, but I think we are coming to a fairly common conclusion here.

For the folks that are not in this hearing room, I think it is probably good that we sort of tell everybody how the numbers we are talking about today fit the numbers they say on the pump.

So today, if you see an 87 octane on the pump, that is an AKI octane, which is equivalent to 91 RON, right? So the 91 octane you see on the pump today, is actually a 95 RON. So just for everybody outside the room, I think it helps to reset that we are not talking about reinventing the entire auto refinery ethanol complex here.

Ms. Skor, is there a value to raising the RVP waiver? And what is that value? As quickly as you can.

Ms. SKOR. So eliminating the RVP?

Mr. FLORES. Yes, ma'am. That is what I meant.

Ms. SKOR. Eliminating RVP, absolutely, you would allow a legal fuel to be sold year-round, when most of the country it is not able to be sold in the summer months when most families are taking their summer vacation travel.

Mr. FLORES. Mr. Columbus, do you agree with that?

Mr. COLUMBUS. I do, sir.

Mr. FLORES. OK. Mr. Columbus, what are the challenges—well, we have got six States that don't allow anything above E10, which is about 19 percent of our gasoline demand in this country today: California, Delaware, Montana, New York, Oregon, and Wisconsin. So this question doesn't apply to those States. For some reason, they don't like higher blends of ethanol.

But, Mr. Columbus, what are the challenges of having an ethanol blend above E15?

Mr. COLUMBUS. It is the same challenge that E15 faces in terms of market introduction. The overall impediment, the biggest impediment, Mr. Flores, is in fact the infrastructure and how we regulate underground storage systems.

Mr. FLORES. OK.

Mr. COLUMBUS. The Office of Underground Storage Tanks says——

Mr. FLORES. So if we go above E15, then we have got a whole new cost element for the consumer, right?

Mr. COLUMBUS. Retailers that are going to E15 now are doing that first and foremost in new facilities and rehabbed facilities. For

the most part, the existing infrastructure is not warranted or certified to take——

Mr. FLORES. OK. I have got a limited amount of time. But if we are asking—I mean, we have had some panelists ask for midblends, E20, E30, higher blends like that. There is a huge consumer cost to that, if we do that, though. Is that correct?

Mr. COLUMBUS. I believe if we do it the way we have talked about, no, because this will——

Mr. FLORES. No, no, I am talking about if we mandated—let's say we mandated a higher RON, 95 or above, and then we also mandated that it has got to be an E20 or an E30, then that is where you get into the higher consumer costs.

Mr. COLUMBUS. Right. If you do a performance specification as opposed to a formulaic specification, the consumer will be best served.

Mr. FLORES. Right. OK.

Mr. Nicholson, if we go to, let's assume, a 95 RON, that gives us the ability to do a nationwide standard from California to Maine, which also matches the RON of Europe.

What are the benefits of that, as quickly as you can share?

Mr. NICHOLSON. For 95 RON, 3 percent improvement in fuel efficiency and reduction in greenhouse gases.

Mr. FLORES. Right. And so you can optimize your engine so that, whether you are selling from either coast, even if you are selling your cars in Europe, it is all one standard, which means better economies of scale for production, and you have a lower impact to the consumer per unit, right?

Mr. NICHOLSON. As I pointed out in my testimony, Europe has had 95 RON for several years, and consumers are getting those benefits. And I think Americans should get the same benefits.

Mr. FLORES. OK.

Mr. Thompson, we talked about several States have standards that prohibit us from going above E10. So, if Congress decides to mandate a formulaic standard in addition to a RON standard, then we are going to have challenges in meeting the standards of some States.

You know, one of the things that has been proposed, one of the comments that was sort of thrown out earlier is that refiners have been anti-ethanol, in so many words. If we raise the octane standard, why would refiners want to use anything other than the cheapest form of octane enhancement, which today is ethanol? Why would that happen?

Mr. THOMPSON. They wouldn't. And I would like to point out that, within my membership, we have some of the largest ethanol producers in the country.

Mr. FLORES. Right.

Mr. THOMPSON. And I will just mention that when we look back—and I say this as someone who worked 3 years at EPA and very familiar with these programs—if you look back where we have gotten in trouble as a country, it is always when there has been a mandate or a formulaic approach.

Mr. FLORES. Right.

Mr. THOMPSON. It just is, versus allowing and creating a performance-based approach to let the market decide the best way forward.

Mr. FLORES. So, again, to repeat where I started this conversation when Mr. Barton yielded me some time, by going to a performance standard, everybody wins: the environment, our consumers, our auto manufacturers, our ethanol constituents, including the advanced and conventional folks, our marketers, retailers, refiners. Everybody wins. So I am not sure why we would want to do anything other than a performance-based standard.

And I do accept the recommendations of Ms. Skor that we do need to address the RVP waiver. So in terms of the legislative solutions, that is something we will definitely keep in mind.

Thank you, Mr. Chairman. I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

We are going to recess this hearing. We will return after votes. And I know there will be a couple of us who will return for that. So the hearing is recessed.

[Recess.]

Mr. SHIMKUS. Thank you all for coming back. We only had one vote, so we will get started.

I would like to now recognize the gentleman from Michigan, 5 minutes.

Mr. WALBERG. Thank you, Mr. Chairman.

What is the RFS standard for AV fuel?

Mr. SHIMKUS. Say that again?

Mr. WALBERG. What is the RFS standard for plane fuel? I am going to get on a plane here shortly.

Mr. SHIMKUS. High octane, baby.

Mr. WALBERG. High octane.

Well, I appreciate this, Mr. Chairman, I appreciate the hearing. And we all wish it might not have been on a fly-out day.

I, for one, I am a motor guy. Living in Michigan, you have got to be a motor guy. Having an almost classic Camaro, I am glad to see GM here. But having antique and classic motorcycles as well, including my Harley, this is an issue of much importance to me.

I have rebuilt engines plenty of times, but it has been primarily because of what I have done to them as opposed to an outside source that can have an impact. And I can't build my classic car engines and motorcycle engines again very easily, changing them from the ground up in order to deal with RFS standards, et cetera.

So this is important. And I don't want them to be expensive doorstops that I can just look at. The Camaro is downstairs in the parking lot in this building, and I enjoy driving it. And so this is important.

Let me ask you, Mr. Columbus, what can be done to ensure consumers are not misfueling their motorcycles, their boats? I have just recently had to buy a new outboard engine because of the destruction on my good old engine that served me very well. I buy premium zero for my outboard motors. I don't buy that for all the rest. I can't afford it for all the rest of my vehicles.

But how do we deal with that misfueling?

Mr. COLUMBUS. The misfueling is going to take a combination of dispenser equipment and I think auto equipment. We are working

with the cars and with the refiners to try to figure out what would be a practical and low-cost regime to protect people from themselves, if you will.

Mr. WALBERG. Well, not only. I mean, if you have a pump with a single hose at it and you have whatever was used last left in it, and I come up with my Harley, and I am going to put 2, 3 gallons in, a good percentage of that may be E15 or whatever.

Mr. COLUMBUS. Unless it is marked E15, it won't be E15. It may very well be E10. And what I would suggest to you is you either go to a place that sells E0—and that is easy for me to say to you—or you take a gallon can with you and fill it about half full with that E10.

Mr. WALBERG. Yes, I carry that on my motorcycle, right. When I take a thousand-mile trip, I am going to carry a gallon thing with me. I am saying, these are things we have to consider.

And I do wish, Mr. Chairman, we would have had representatives from the marine industry, the motorcycle industry here as well to talk about this, because they are not satisfied that it is going to be for the industry, that it is going to work.

Mr. COLUMBUS. But one of the other things you might consider doing is talking to EPA about making its product transfer documents regime a little simpler for people, because there is in fact an ethanol-derived fuel, isobutylene, that is a drop-in fuel, it is completely compatible. But trying to get it to the market based on the fact that EPA says you have to have product transfer documents that say you can blend it with that blend stock is really tough.

Mr. WALBERG. Yes, well, let's be careful about this.

Let me go to Mr. Nicholson. Thank you for being here.

What is the investment required for automakers to make the change to vehicles designed for high-octane fuels, and how much time will you need to do it?

Mr. NICHOLSON. Thank you for that question.

As I said earlier, switching over all the engines to high compression ratios is literally going to be billions of dollars, investments spread across all the U.S. CAR and other auto manufacturers.

Lead time-wise, we really need 4 years minimum, and that is actually going fast when you think about making all those changes. So, if we were to get legislation this year, we think we could be ready for 2022 calendar year or 2023 model year. That is why we have got a sense of urgency of really trying to go fast as we can here to get this legislation.

Mr. WALBERG. What do you expect the increase in fuel mileage will be? And what is going to be the cost to consumer?

Mr. NICHOLSON. The increase in fuel economy from the 95 RON proposal we think is 3 percent. Some consumers may not notice that as much, but it is really substantial when you think about the CAFE impact. And we think there is about a 3-to-1 ratio, so you get three times more benefit than what the cost would be at the pump. We think this is an excellent value for consumers.

Mr. WALBERG. This is the lowest-priced way that you think you can meet CAFE?

Mr. NICHOLSON. Exactly. For now, this is the most efficient way. Of all the things that we are doing and considering, this is the most cost-effective one that we have.

Mr. SHIMKUS. The gentleman's time has expired. I would remind the gentleman that we did have small engines here at our last fuels hearing.

So with that, I would like to turn to the gentleman from California, Mr. Ruiz.

Mr. RUIZ. Thank you, Mr. Chairman. I know how it is when you sit on the committee and wait for the very last person, so I am going to yield my time to Mr. Loebsack from Iowa.

Mr. SHIMKUS. You are very kind.

The gentleman from Iowa is recognized.

Mr. LOEBSACK. Thank you, Mr. Ruiz.

And thank you, Mr. Chairman, for holding this hearing, and thank you for letting me be waived onto this subcommittee as well. I am going to have to think of something to help Mr. Ruiz with, because that was very kind of him.

Listen, I think we all know that the future of America's transportation fuels is an important topic going forward, and I have really enjoyed the debate today, such as it has been.

We have had some positive moments, including yesterday when the President publicly supported allowing year-round sales of E15. We want to make sure that he follows through with that going forward. That is an issue that I have championed with Congressman Smith from Nebraska. We have had legislation that we introduced on that front.

But there have been some seriously concerning moments when it comes to these kinds of issues. We have seen recently some reports about the waivers that the EPA has granted to small refiners, so-called small refiners, to release them from their obligations under the RFS program.

And one of the problems is that these waivers have occurred sort of under the cover of darkness, too. It hasn't been an entirely transparent process. And I brought that up with Energy Secretary Perry yesterday, as a matter of fact, in this very same room. And essentially, they have amounted to giveaways by the EPA, I would argue, to some of the Nation's largest, most profitable refiners.

As you all can imagine, the biofuels community and farmers in Iowa have expressed significant concerns about these reports to me directly, as a matter of fact. And these concerns have been echoed by many, including the Secretary of Agriculture himself, Sonny Perdue, who stated earlier this week that these waivers reduced the statutory volume gallon for gallon, essentially.

So it has become quite clear to me that this action does constitute a demand reduction—destruction, in effect, and a reduction, if you will. And I can only imagine how harmful this will be to Iowa farmers, to Illinois farmers. Also, to the folks who support the industry, all the workers in the biofuels industry that we often don't think enough about, I would argue.

So, Ms. Skor, I am really happy to see all of you here today, but I want to ask you, in particular, a couple questions, if that is all right.

Do you believe that the EPA is misusing these hardship waivers?

Ms. SKOR. Absolutely. We would agree with our Secretary of Agriculture, as he said that.

There are a few very troubling things about what is taking place right now. One is that this is under the cover of night, so we don't know how many refiners are getting waivers and we don't know the justification.

From the reports that we have seen, just for 2017, Mr. Pruitt has quadrupled the relatively historical number of waivers granted. And the impact of the behavior that we are seeing coming out of EPA is you are taking over a billion gallons of demand out of the marketplace. Every waiver granted is a gallon of biofuel that is not blended.

Mr. LOEBSACK. Right. And as I said, we did have Secretary Perry right here yesterday, and I did ask him about that. Because by law the EPA is supposed to consult with the DOE before they do this. And he said that did happen, but he wasn't particularly specific about that consultation.

So I have submitted a number of questions to him in terms of how often this has happened since 2013 so he can get back to us. And we want to know specifically when it has happened.

So you mentioned about a billion gallons, you think, of biofuels?

Ms. SKOR. Over a billion gallons. And that is moving us backwards to 2013 blending levels. So with these steps, we have moved back 5 years and turned back the clock on the progress of the RFS.

Mr. LOEBSACK. And that is very disconcerting, obviously.

Mr. Jeschke, it appears to me that the biofuels industry and agricultural groups have not yet identified what the right path forward on octane is. Would you agree with that, that we haven't gotten an agreement?

Ms. SKOR. Yes, I would.

Mr. LOEBSACK. How about you, Mr. Jeschke?

Mr. JESCHKE. Yes.

Mr. LOEBSACK. And just make sure that everybody here keeps us up to date on what is going on. I know the committee is going to be kept up to date. But we want to make sure that we are in touch with all the stakeholders, really. I have only asked questions of two folks. But I am concerned that this be something that all the stakeholders do take into account and have some input on going forward.

I would agree with the Chair of our committee that, while I was not here in 2005, clearly things have changed here in America. But we still have a lot of the same concerns around the RFS and why we have the RFS in the first place. And part of it is I don't want to be sending relatives that I have over to the Middle East to fight in a conflict where oil is at stake.

We do have a national security issue here. But, as one person from Illinois just a minute ago told me confidentially in a conversation, this is about food and agricultural security as well. We have to keep that in mind going forward.

So thanks, everybody. I appreciate it.

And thank you again, Mr. Ruiz, for allowing me to go ahead.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the gentleman from Texas—we have a few of those on this committee—Mr. Olson, for 5 minutes.

Mr. OLSON. Thank you, Mr. Chairman.

And before I talk about the RFS, I want you all to note a very important thing to happen about 2 hours ago in this committee. Our chairman proved he is a want-to-be Texan. He keeps saying "y'all" and "in Texas, bigger is better." Recognition, he is my mentor. He gave me a Shimmy, a bobblehead John Shimkus. I am going to put a cowboy hat.

Welcome to Texas, Mr. Chairman.

I want to be serious about, as you all know, I have some deep concerns about going forward with the RFS as it stands today. It was designed for a very different American energy environment. We were an importer of oil and gas. Now we are an exporter. I think today it stands as a very flawed mandate.

One problem I have with the RFS is the severe costs it has placed on smaller independent refiners, like CVR, which is headquartered in my district, Sugarland, Texas. For those reasons, I worry about the potential cost of an upgrade to newer, higher octane fuels.

First question to you, Mr. Thompson: Could you please talk about what sorts of projects you have or changes we have to make to move to a higher octane fuel, and what that might cost? Would that be doable for small refiners like my guys in Sugarland, Texas?

Mr. THOMPSON. Well, a couple things. We are very proud of CVR as well, CHS, and all of our small merchant refiners, and they are supportive of me being here today and talking about higher octane, for sure.

So initially moving to a higher octane standard, provided it is on a proper glidepath, there would be little investment required because we have the capability now to deliver the volumes that a new fleet of automobiles would require.

Over time, it would require investment. A preliminary analysis would be literally tens of billions of dollars to develop new ways and new capacity for octane sources.

I can't get into the specifics because every refinery is different, as you know, and there are lots of different ways to increase octane, so each refinery would have to look at its operations.

But this would be a major investment. And the only reason we are willing to do it is because we would prefer to make this investment than the investments that we are required every year to comply with the RFS, which is doing very little to help consumers.

Mr. OLSON. One final question. This came up with Secretary Perry yesterday, sitting just where Mr. Nicholson sat.

He spent a lot of time in Iowa in 2016 running for the White House. That seems to be an important place to have spent a lot of time here. He had a lot of dealings with ethanol, obviously, in a corn State.

He said his perception was the people who produce corn in America care a little bit about where the ethanol goes, what gas tanks, but they don't care too much American or overseas. They just want a supply source so they can put their ethanol in a gas tank.

He brought up the idea of exporting our ethanol to Mexico. Any thoughts about, Mr. Jeschke? I mean, the idea just popped in my head yesterday, but that might be a viable alternative to what we have right now.

Mr. JESCHKE. Well, the U.S. Grains Council, of which I am a part—I sit on one of their committees—is looking at Mexico and is very involved with corn grower checkoff money in trying to educate and help the Mexicans figure out how they might replace MTBE—which I know is a favorite of some of you, and that is used in Mexico now extensively—but looking to possibly replace that with ethanol.

So we are looking at all export markets as an opportunity to try and grow our demand. So that is currently going on. It isn't something that would be brand new.

Mr. OLSON. Ms. Skor, your thoughts on exporting ethanol to Mexico?

Ms. SKOR. We are thrilled that Mexico has opened its markets and is looking at ethanol and E10. And so we have been in regular conversations with stakeholders in government and industry there.

I would say that exporting homegrown renewable fuel to Mexico is wonderful, in addition to making sure that we are taking advantage of this homegrown renewable fuel in our backyard.

Mr. OLSON. Thank you. My time is over. It is time to mosey on down the road, like we say in Texas. I yield back.

Mr. SHIMKUS. I did think the gentleman did say a small refinery in Texas. Didn't you call it a small refinery?

Mr. OLSON. It is in Kansas, actually. The headquarters is in Sugarland, but the refinery is up in Kansas, a rather small one.

Mr. SHIMKUS. The headquarters of a small refinery is in Texas.

Mr. OLSON. Yes.

Mr. SHIMKUS. OK. I just want to clarify just for the record.

Mr. OLSON. Come to Texas. You will learn about more about it.

Mr. SHIMKUS. Now, I would like to recognize the gentleman from Georgia for 5 minutes, Mr. Carter.

Mr. CARTER. Thank you, Mr. Chairman. I don't know how to follow that exchange, but nevertheless I will do my best.

Thank you all for being here. Let me tell you, I represent the entire coast of Georgia. I have over 100 miles of coastline. My concern in this hearing today is mainly about marine engines, because we are having a lot of problems with the new blends having degradation on our engines, and it is something I am very concerned about.

It is my understanding that the butanol has properties that more closely resemble that of gasoline, or align with gasoline, than ethanol does and that it has less of an impact, less of a negative impact on the engines.

In fact, the National Marine Manufacturers Association and the American Boat and Yacht Council underwent a 5-year study with the Department of Energy studying this, and from what they have come up with—comparing it to ethanol—and that study said that biobutanol and similar biofuels have a higher energy content and similar emission properties and reduction properties while lowering the degrading properties on the engines.

Have you heard of this? Has anyone heard of this?

Mr. COLUMBUS. Yes, sir.

Mr. CARTER. Mr. Columbus. Yes, that is fine.

Mr. COLUMBUS. I have. The producers of isobutanol are eager to try to work something out with EPA so that they can, in fact, put

their additive with blend stock set for E10. They have got to go through a whole process. Anything you can do to help EPA——

Mr. CARTER. So you are telling me the problem is something that we need to be addressing here in Congress—or in EPA?

Mr. COLUMBUS. There is a regulatory impediment to their taking a product to market in an efficient way. And yes, it is EPA, and my bet is that the folks at EPA would be thrilled to hear from you about this.

Mr. CARTER. OK. Well, thank you for that information. I didn't realize that. And that is very important.

Can it work? I mean, do you think that this would be better?

Mr. COLUMBUS. Look, it is a different thing than fuel ethanol.

Can it work? Sure. It is a relatively small production item today.

Mr. CARTER. All right. Can I stop you right there and ask you: It is a relatively small production item today, how are we going to get to it market, then? Because it is not going to do any good if we can't get the product to the people.

Mr. COLUMBUS. You will get it to market the same way ethanol historically has gotten to market. It will go by train or barge and it will go——

Mr. CARTER. But I am talking about demand, if there is not enough demand for it.

Mr. COLUMBUS. Well, I think what you have just said is, if it is marketed properly in the marine community, there will be plenty of demand for it. How it will get to that market will be the same way that ethanol moves or that any other component moves.

Mr. CARTER. Right. I understand the transportation. But I am just looking at it in terms of the economics. I mean, if there is not enough of a market there, a demand for it, then I am afraid it is not going to get to people.

Mr. COLUMBUS. Well, the manufacturers of it assure me that they think there is plenty enough demand to support their efforts.

Mr. CARTER. OK.

Mr. COLUMBUS. They are just trying to get rid of the regulatory impediment.

Mr. CARTER. OK. Well, fair enough. And we certainly will try to see about it.

Let me ask you, while I have got you, Mr. Columbus, about how it is marketed. And let me ask you something. You know what E88 and E15 mean to my wife? Absolutely nothing. And yet we have this problem with marketing.

And that is a big concern of mine, because we have got a number of consumers who are using these fuels inappropriately and putting them in marine engines, and it is causing them significant problems.

Mr. COLUMBUS. Mr. Carter, with due respect to those people that you know who do that, I cannot help them if they will not read letters that are this big on the pump that say don't do that.

Mr. CARTER. I get it, and I understand that. But at the same time, can we do a better job of the marketing process of it?

Mr. COLUMBUS. Well, I think all of us have done what we can when we ruled out these ultra-low sulfur fuels. When we roll out a new fuel, EPA undertakes an effort with the refining community, with the marketing community to educate consumers.

I cannot help people who will not read these things. And I know that sounds hard. But what you are finding out is the number one thing that people buy gasoline on isn't what it says on the pump, it is the big, stupid price sign. It is, what does it cost?

Mr. CARTER. Absolutely. I would agree with you.

Mr. COLUMBUS. And if they are prepared to put their second-most expensive investment at risk for 3 cents a gallon or 4 cents a gallon, it is a choice.

In the 1970s, I watched people carve out fill pipe restrictors to put leaded gasoline into a car meant to take unleaded and then were angry and sued retailers because they said, "That leaded gasoline that you let me buy at your outlet poisoned my catalytic converter, and when I went to register my car, it cost me a thousand dollars." I can't help those people.

Mr. CARTER. Mr. Columbus, I am with you. I understand your point. I think it is a valid point. But with all due respect, I think that we and the industry can do a better job in helping by simply using better marketing and——

Mr. SHIMKUS. The gentleman's time is——

Mr. CARTER. Excuse me, I am sorry. I didn't realize that.

So I hope you understand my point.

Mr. COLUMBUS. I empathize with your problem, Mr. Carter.

Mr. CARTER. Thank you.

Thank you. And I yield back.

Mr. SHIMKUS. The gentleman yields back. I want to thank my colleague.

We have got an agreement by my friends on the minority side to be able to go to one more round, if that is OK with you all. Obviously, there are only a few of us left, so I don't think it will take very long. So I will recognize myself for 5 minutes, too, for a second round of questioning.

Thank you all. Understand, this where we need your help. There are a lot of things that we need to hash out. So understanding that a 95 RON fuel can be produced in different ways by different refineries, can you estimate how many billions of gallons—not now, help us, provide this information—estimate how many billions of gallons of ethanol would be used to produce a RON fuel at EO, E10, E15, et cetera? We had conversations about this over the last couple days.

We need to know that. And I would even suggest you could do it collectively, peer-reviewed. We need those numbers.

The other thing that popped in my mind is, if the vehicle fleet transforms or starts moving 7 percent every year, so a whole passenger vehicle—except for my very old car that I drive, there will be a few outsiders there—13 years, right? So I don't know if it is possible. What happens in this 13-year transition to a high-octane standard, and where are the billions of gallons of what we would hope would be homegrown ethanol produced in America, right?

We really just need numbers. Again, you could do it collectively, peer-reviewed. If you want to do it separately, then we will fight about whose numbers. Formulas are formulas. We will need defined variables. But we just need that help, and I would ask that you would do that.

Another question is, Whatever the high-octane standard is set at, would you imagine a market for even higher octane fuels above that level? And we can just go through, and then I have a follow-up to that.

Mr. COLUMBUS. Yes, sir, absolutely. If you take a look the way fuels have developed over the last 78 years, you will see that there is always a creep.

With respect to Mr. Nicholson, somebody at GM is going to look at you and say, "That Corvette of yours, if you want it to purr like a kitten, you would run it on 98 RON or 100 RON." It is just how things happen.

So, yes, we anticipate that 95 RON will ultimately become a floor.

Mr. SHIMKUS. Ms. Skor.

Ms. SKOR. I would hope, yes, that there would be a continued appetite for even greater octane in the country.

Mr. SHIMKUS. Mr. Nicholson.

Mr. NICHOLSON. Yes. First of all, Mr. Shimkus, I would like to offer that U.S. CAR could be the broker to kind of do this analysis that you talked about. So we would certainly be willing to work with everyone on this panel to just do that analysis peer-reviewed so that we could get back to this committee with those numbers.

Mr. SHIMKUS. Thank you for that offer.

Mr. NICHOLSON. So I will just say that to anybody on the panel that would like to be part of that.

To your question, for sure there will be premium fuels on top as there are today. As mentioned, Corvettes will always want to use the best possible, as well as luxury cars. So I see that market developing.

In fact, I would even go further to say there could be even more demand in the future, given the very difficult CAFE regulations that are in front of us. You know, OEMs actually have an incentive to specify premium required, because we then get to take advantage of that octane with the regulators in certifying that.

What prevents us from doing that today is the cost-prohibitive 50 cents per gallon that you see at the pumps, and most customers, except for performance vehicles, just won't put up with that.

Mr. SHIMKUS. Great.

Mr. Jeschke.

Mr. JESCHKE. Yes. I would hope that we would look to those higher blends, higher octane with higher blends, because I think concern for the environment will not get less. I think it will continue to become greater and greater. So I believe the higher octane fuels, as Mr. Nicholson said, will help them to achieve those goals.

Mr. SHIMKUS. Mr. Thompson.

Mr. THOMPSON. Well, we are certainly prepared to offer up 95 RON as a floor, not a ceiling, and let the market decide where it should go.

And I will just note that E15 and E85 have been around a long time, and consumer preference has decided where those products go. We do not control access to market.

So the consumers are going to decide whether they go higher. We would be open to it, provided that the floor is 95.

Mr. SHIMKUS. Great. Let me finish with this last one: What regulatory actions would be needed to make that extra-high-octane fuel available?

Mr. COLUMBUS. You have to have a modification of the one-pound RVP waiver. And I think you have to let the infrastructure evolve or you have to change the regulations—again, the Office of Underground Storage Tanks at EPA—the latter of which I do not believe any of you are going to be prepared to do.

So the reason we are as supportive of this roll-in as we are is we believe the infrastructure will build out, and it will build out earlier because they will see down the road there is a guaranteed return.

Mr. SHIMKUS. So my time has expired. I will look at my colleagues. Can I finish this question? Is that all right?

So, Ms. Skor.

Ms. SKOR. So I just want to kind of clarify, what is most important and critical from the consumer perspective, especially when you are looking at fuel diversity and choice at the pump, is access. When consumers have access to E15, which is unleaded 88, and a 5-to-10-cent gallon savings, what we are seeing is they embrace it. They wholeheartedly embrace it. And if you look at the sales of E15, they are increasing when consumers have access.

But the most important point there is access. A big impediment to that consumer access is Reid vapor pressure. So you grant that and you allow full-year sales. And I think that is one of a few impediments that we need to allow consumers to be able to access higher-blend and better-for-the-environment fuels.

Mr. SHIMKUS. Mr. Nicholson.

Mr. NICHOLSON. First of all, I would say that perhaps a national standard for a premium kind of fuel might be a facilitator for a market demand for such a thing. Should be, from my point of view, a performance-based standard. But 95 RON can be the regular fuel, and there could be a national standard for a higher one. That might be a good idea.

We will need some kind of cooperation with regard to EPA. It has been briefly mentioned here. And I just wanted to point out that our vehicles today are certified to the 9.0 PSI RVP certification fuel. So it needs to be ensured that this requirement is met regardless of fuel composition to ensure the proper operation of the evaporative emission system. So we are going to have to work out some details, but I think it can be done.

Mr. SHIMKUS. Mr. Jeschke.

Mr. JESCHKE. Yes. I guess, Mr. Chairman, I would just point to the points that I mentioned in my opening statements.

Mr. SHIMKUS. Very good. Thank you.

Mr. Thompson.

Mr. THOMPSON. Quickly, I can't help myself. Access. Refiners, we own less than 4 percent of the retail stations. We don't control access. Mr. Columbus can attest to that. So this notion that big, bad oil is preventing access simply is not true.

As far as—if I understand your question about how do we get to 95 RON—it is for the RFS to sunset, and in return for that we will be committed to a 95 RON standard.

Mr. SHIMKUS. Yes. I think it was like, if 95 is a floor, then what would be the regulatory actions we need?

Mr. THOMPSON. OK. I am sorry. Then the issue is EPA has mechanisms now. E15 got to the market without a big overhaul of the Clean Air Act. EPA has mechanisms now for certification fuels to get authorized. I would say go through the process.

Mr. SHIMKUS. Thank you. And I will return the balance of my time. And I again thank my colleague, Mr. Tonko, for allowing us to go a second round and recognize him for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair.

Mr. Nicholson, as I understand it, any and all cars on the road today can use premium fuel?

Mr. NICHOLSON. You say can they use premium?

Mr. TONKO. Yes.

Mr. NICHOLSON. Well, yes, they can.

Mr. TONKO. So when GM creates this new vehicle, this new engine, they are recommending use of premium. You are suggesting it runs it better. But what is to deny the consumer from fueling up with regular without damaging the engine? So basically if it is the choice of premium or regular, cheaper or more expensive, how do we guarantee that any benefits of that premium use will actually be realized?

Mr. NICHOLSON. Well, thank you very much, and I just want to come back to Mr. McKinley's point. You know, consumers could do that today. I don't really know anybody that does that, because putting premium in a regular-fueled vehicle doesn't get you any benefit.

What we are proposing is not premium fuel. It is a new 95 RON high-octane fuel for new greenhouse gases.

We still definitely have to deal with the misfueling issue. For example, if someone generally were to use the new 95 RON fuel in a 2018 model regular vehicle, there would really be no problem. You would have higher octane, but it would be very little benefit because the vehicle wasn't designed for that. So what we are proposing is the engines are designed and they use the new fuel.

The misfueling problem we worry about is they use today's regular fuel in their new vehicle designed for 95 RON. That is a problem, and that is a remaining issue. So we have got misfueling risks that we need to work on.

Mr. TONKO. So do you then require premium, not recommend it?

Mr. NICHOLSON. We require the new 95 RON fuel. That is what we would do, and we need all OEMs to go together to do that. The analogy maybe is just the way we switched from leaded fuel to unleaded fuel.

Mr. TONKO. So you are redesigning an engine that will require, not recommend, premium?

Mr. NICHOLSON. Yes. Exactly. It will be required. And we are going need all the OEMs to go together to make this work.

Mr. TONKO. OK. I yield back, Mr. Chair.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair then now recognizes the gentleman from Texas, Mr. Flores, for 5 minutes.

Mr. FLORES. Thank you, Mr. Chairman.

Ms. Skor, you recommended that we have a one-pound RVP waiver year-round for all blends of gasoline E10 and above—or, well, any E level. Is that correct?

Ms. SKOR. Correct.

Mr. FLORES. OK.

Mr. Columbus, would there be any problems from your constituents' perspective?

Mr. COLUMBUS. It is not a problem for us. I mean, what we propose is a waiver for any fuel that has an RVP that is equal to or less than E10, and you can go up to E25 or so.

There is an infrastructure problem. It is no fun to talk about underground storage tanks. Nobody likes that. And nobody sees them. And well over 60-something percent of the retail outlets in the United States have changed hands since the turn of the millennium. Most of those tanks, the owner doesn't know exactly what he has got.

So the impediment to taking the fuel on through is that it is a violation of the Resource Conservation Recovery Act to store E15 or E20 in an underground storage tank that the owner and operator cannot demonstrate was warranted to be compatible with that blend.

Mr. FLORES. Let me try to come back to the original question, though. Is there a downside to having the RVP waiver, the one-pound waiver, year-round for your constituents?

Mr. COLUMBUS. No, sir.

Mr. FLORES. OK.

Mr. COLUMBUS. No, sir.

Mr. FLORES. Sorry, I didn't mean to cut you off, but I know the chairman will eventually.

Mr. Nicholson, is there any problem for U.S. CAR?

Mr. NICHOLSON. As I mentioned previously, our vehicles are certified to the 9 PSA RVP certification fuel. So it just needs to be ensured that this requirement is met regardless of the waiver or not to ensure the proper functioning of evaporative emissions systems.

Mr. FLORES. OK.

Mr. Jeschke, would your constituents have any issue with it? I think you asked for it in your testimony, if I recall.

Mr. JESCHKE. That is correct.

Mr. FLORES. OK.

Mr. Thompson, is there any problem with your constituency?

Mr. THOMPSON. With?

Mr. FLORES. With a one-pound waiver year-round for all grades, all blends.

Mr. THOMPSON. We are willing to entertain the idea as a part of a comprehensive RFS solution.

Mr. FLORES. That is where I am going with this, is if we talk about——

Mr. THOMPSON. We would not be too keen to the idea, as has been reported yesterday, in exchange for nothing because—that is not something we are interested in.

Mr. FLORES. OK.

Mr. THOMPSON. We are willing to put it all on the table like we are doing. We have been very candid.

Mr. FLORES. Right, and that is what I am talking about. I mean, I am trying to address the needs of the broadest constituency possible, I mean, from the environment to the consumer to all of your constituencies at the table.

So you kind of introduced the next part of this question, and that is, if we don't do anything, we have got a status quo. And I think several of you have complained about the way the EPA has adjudicated the RFS. And so do all of you feel like a statutory solution is the better outcome here than where we are today?

Mr. Thompson, I will start with you.

Mr. THOMPSON. Absolutely.

Mr. FLORES. OK.

Mr. Jeschke.

Mr. JESCHKE. I couldn't answer that, I guess, without consultation.

Mr. FLORES. OK.

Mr. Nicholson.

Mr. NICHOLSON. We believe a legislated solution will be really helpful to the overall process to make sure that all the parties are coordinated together, which is really important.

Mr. FLORES. OK.

Ms. Skor.

Ms. SKOR. I believe that a conversation about high-octane fuels can—and I am glad we are having that—I also believe that conversation can have outside of any conversation to do with the Renewable Fuel Standard. This body can move us toward a path of a national fuel standard and doesn't need to do that in the context of the Renewable Fuel Standard.

Mr. FLORES. Would you repeat your answer now? Say that again.

Ms. SKOR. Sorry.

Mr. FLORES. I want to make sure I can drill into this one.

Ms. SKOR. I applaud the conversation today about moving toward a high-octane standard.

Mr. FLORES. OK.

Ms. SKOR. But this body can move toward that goal without touching the Renewable Fuel Standard.

Mr. FLORES. I see what you are saying. OK. All right.

Let me say this: Is what we are looking at in terms of a statutory solution preferable to where we are today, where you have got the EPA that is doing things that you already said today you don't like?

Ms. SKOR. I actually would not say that a statutory action is preferable to the situation. I think the challenges with EPA are on the administrative side, and we need to make sure that the EPA is implementing as envisioned by Congress.

Mr. FLORES. OK. And those aren't unique to this administration, right? I mean, this was going on in the years prior to this administration.

Ms. SKOR. Yes, we have got—there are some different challenges most recently, yes.

Mr. FLORES. OK. All right.

Mr. Columbus.

Mr. COLUMBUS. My answer is yes. My concern about what is going on with the status quo is, because of the things that have

been going on, there is a significant amount of uncertainty in the market. And commodities markets really like certainty. When there is uncertainty, you see values go up, down, sideways. People who are involved in the system get caught in a box.

So we think you should move forward, and we like the high-octane solution as a good place to start.

Mr. FLORES. Can I indulge the chairman and the ranking member to give me 1 more minute?

Mr. SHIMKUS. Without objection.

Mr. FLORES. OK. Thank you.

So my final question is this. Mr. Nicholson, this will be for you. And I am glad to hear that there is a fighting Texas Aggie in terms of worldwide propulsion for GM. I can't wait for you all to build a 700-horsepower Tahoe for me that gets 35 miles to the gallon.

That said, we are talking about something that is really broader than the U.S. possibly here. And when we talk about worldwide environmental impact, you said that there is already a 95 RON standard in Europe.

Mr. NICHOLSON. Yes.

Mr. FLORES. If we have one single nationwide standard in the United States for 95 RON, what other countries would likely follow on? Which would make U.S. CAR and U.S. refining and U.S. ethanol, put us all kind of on the same—and consumers—kind of all on the same page.

Mr. NICHOLSON. Yes, thank you. As you pointed out, Europe has already proven that 95 RON is a great solution that delivers efficiency. As I said earlier, I think Americans deserve at least as good a fuel as the Europeans have. And I think, by historical patterns, let's say, there is high likelihood that Canadian and Mexican would, let's say, follow.

Mr. FLORES. OK. So we could set a new emissions profile for the entire North American continent.

Mr. NICHOLSON. I think one national standard would provide leadership and show leadership that would likely be followed.

Mr. FLORES. OK.

Thank you for your indulgence. I yield back. It was a great hearing today.

Mr. SHIMKUS. Thank you. The gentleman yields back his time.

Seeing no further Members wishing to ask questions for this panel, I would like to thank all of you for being here again today.

Before we conclude, I would ask unanimous consent to submit the following document for the record: a letter from my friends at the Renewable Fuels Association. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. SHIMKUS. And pursuant to committee rules, I remind Members that they have 10 business days to submit additional questions for the record.

I ask that witnesses submit their response within 10 days, except for that probably lengthy review of billions of gallons. That will take longer than 10 days, I would assume.

Without objection, the subcommittee is adjourned.

[Whereupon, at 11:35 a.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

RFA RENEWABLE FUELS ASSOCIATION

April 12, 2018

The Honorable John Shimkus
Chairman
Subcommittee on the Environment
Committee on Energy and Commerce
U.S. House of Representatives

The Honorable Paul Tonko
Ranking Member
Subcommittee on the Environment
Committee on Energy and Commerce
U.S. House of Representatives

Dear Chairman Shimkus and Ranking Member Tonko:

RFA is the leading trade association for America's ethanol industry. Its mission is to advance the development, production, and use of fuel ethanol by strengthening America's ethanol industry and raising awareness about the benefits of renewable fuels. Founded in 1981, RFA serves as the premier meeting ground for industry leaders and supporters. RFA's 300-plus members are working to help America become cleaner, safer, more energy secure, and economically vibrant. In advance of the Energy and Commerce Subcommittee on the Environment's hearing this week on "High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities," we wanted to be sure the Subcommittee was provided the perspective of American ethanol producers.

As the cleanest and most affordable source of octane available, ethanol can play a pivotal role in enabling low-cost advanced vehicle technologies that will improve fuel economy and significantly reduce emissions of harmful tailpipe pollutants and greenhouse gases (GHG). Ethanol has unique properties that make it a highly attractive octane component for the high-octane fuels that will enable the advanced engines of tomorrow. Not only is ethanol a renewable fuel that offers superior GHG performance, but it also is lower cost than other octane sources, possesses an extremely high octane rating (109 RON), a high heat of vaporization, and high octane sensitivity. The auto engineers, government scientists, and academic researchers who are examining the costs and benefits of our future fuel options have identified these attributes as highly desirable.

Internal combustion engines will continue to be the predominant light duty vehicles propulsion technology through 2025 and beyond.

Internal combustion (IC) engines powered by liquid fuels will continue to serve as the most prevalent propulsion technology for light duty vehicles (LDVs), with the U.S. Environmental Protection Agency (EPA) under the previous administration admitting that only "modest levels" of strong hybridization and "very low levels" of full electrification (plug-in vehicles) are expected

by 2025.[1] Further, the efficiency of modern IC engines can be significantly improved through increased adoption of incremental technologies that exist today or are near commercialization.[2]

According to Paul Whitaker, powertrain and technical director for AVL Power Train Engineering, "We see big efficiency improvements with (IC) engines today and see the potential for lots more in the future, and they are very inexpensive relative to the other options."[3] Additionally, the U.S. Department of Energy (DOE) states that "...vehicles with internal combustion engines will continue to comprise a significant portion of the nation's vehicle fleet for the next several decades."[4] Further, the National Research Council (NRC) states, "...spark-ignition engines are expected to be dominant beyond 2025."[5]

Further improvements in IC engine efficiency are imminent, and such improvements are relatively low cost in comparison to other options.

Many of the advanced IC engine technologies expected in the next decade call for fuels with higher octane ratings than today's regular grade gasoline.

Increased use of advanced IC engine technologies has already resulted in greater demand for higher octane fuels. For example, growth in turbocharging has already resulted in increased demand for higher-octane fuels, according to recent analysis by the Energy Information Administration (EIA).[6] The EIA analysis suggests that more stringent CAFE and GHG standards caused automakers to increase the market penetration of turbocharging from 3.3% in MY2009 to 17.6% in MY2014. The surge in turbocharging was accompanied by an increase in the demand for high octane premium gasoline, according to EIA. In fact, premium gasoline sales rose from 7.8% of total gasoline sales in June 2008 to 11.3% of total gasoline sales by September 2015.

According to the EIA analysis, "As automakers produce more vehicles with turbocharged engines, it is likely they will recommend or require more LDVs to use higher-octane gasoline. Premium gasoline sales as a percent of total gasoline sales are likely to increase as more car models either recommend or require premium gasoline. This increase is expected to continue as automakers increase the use of turbocharging as one strategy to comply with increasingly stringent fuel economy standards."

The EIA report is corroborated by analysis performed by MathPro, Inc., a consulting firm that specializes in petroleum refining economics.[7] MathPro's analysis shows that the average pool-

---

[1] EPA, NHTSA, CARB (July 2016), "Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025", at ES-2.

[2] *Id.*, at 5-12 ("[i]nternal combustion engine improvements continue to be a major focus in improving the overall efficiency of light-duty vehicles." and "Vehicle manufacturers have more choices of technology for internal combustion engines than at any previous time in automotive history and more control over engine operation and combustion.")

[3] Detroit Public Television. Aug. 21, 2016. *Autoline with John McElroy*. Episode #2026 ("Deep Freeze for the ICE?")

[4] U.S. Department of Energy. *Co-Optimization of Fuels & Engines for Tomorrow's Energy-Efficient Vehicles.* Available at: http://www.nrel.gov/docs/fy16osti/66146.pdf

[5] National Research Council, Committee on the Assessment of Technologies for Improving Fuel Economy of Light-Duty Vehicles. June 2015. *Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles,* at S-4.

[6] EIA. April 6, 2016. *Engine design trends lead to increased demand for higher-octane gasoline.*

[7] MathPro, Inc. Sep. 8, 2016. *Capturing Ethanol's Octane Value in Gasoline Blending*. Webinar presentation to RFA members. (Available upon request)

wide octane rating for gasoline increased from approximately 88.2 AKI in 2009 to 88.5 in 2015, largely as a result of increased sales of vehicles requiring or recommending the use of premium gasoline. In examining EPA projections of future advanced IC engine technology deployment, MathPro concluded that greater use of higher compression ratio and turbocharging will "substantially increase the call for octane."

Based on projected growth in turbocharging alone, MathPro calculated that premium gasoline could account for 17-22% of total gasoline sales by 2025, depending on varying levels of consumer adherence to the auto manufacturers' fueling recommendations. According to MathPro, "By itself, increasing the use of turbocharging could increase the required average octane of the gasoline pool by 0.3-0.6 numbers (AKI), depending on consumer response to fueling recommendations." Notably, this MathPro analysis does not account for the impact of high compression ratio (HCR), which would further intensify the call for octane. EPA projects HCR naturally aspirated (NA) engine technology will need to penetrate 44% of the market by MY2025 (compared to 3% or less today) to facilitate compliance with future CAFE/GHG standards.

It is important to note, however, that retail prices for premium grade gasoline have annually averaged 7-16% more than regular grade gasoline prices since 2010 ($0.24-0.40/gallon).[8] This cost increase likely has deterred some owners of GDI, turbocharged vehicles from purchasing premium, even though the manufacturer recommends or requires premium. The cost discrepancy between regular and premium grade gasoline also highlights the need to leverage lower-cost sources of octane, such as ethanol.

Historically, Federal regulations have failed to treat IC engines and liquid fuels as integrated systems, even though fuel properties can have significant effects on fuel economy and emissions.

By itself, the IC engine does nothing to propel a light duty vehicle or generate GHG emissions. It is only when a liquid fuel is introduced into the engine that the technology works to deliver the service of mobility. In this way, IC engines and liquid fuels combine to form a highly integrated system in which one component is useless without the other. Indeed, the IC engine's efficiency and emissions can be greatly affected by the characteristics of the liquid fuel used in the engine.

DOE's Co-Optima program appropriately recognizes the symbiotic relationship between fuels and engines, and should be used as a model for future fuel economy and GHG regulations. Recognizing that fuels and engines must be developed in concert to maximize efficiency and emissions reductions, DOE has launched an initiative to focus on "Co-optimization of Fuels and Engines for Tomorrow's Energy Efficient Vehicles." The initiative, known simply as "Co-optima," endeavors to "...simultaneously tackle fuel and engine innovation to co-optimize performance of both elements and provide dramatic and rapid cuts in fuel use and emissions."[9] Co-optima has two major research tracks, the first of which is "...improving near-term efficiency of spark-ignition engines through the identification of fuel properties and design parameters of existing base engines that maximize performance."[10] Importantly, this track includes identifying "candidate fuels" for use in co-optimized engines to achieve peak performance, energy efficiency and emissions reductions. The "market introduction target" for co-optimized fuels and IC engines under this research track is 2025.

---

[8] EIA. *Retail Gasoline Prices*. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm Accessed Sep. 12, 2016.

[9] U.S. Department of Energy. *Co-Optimization of Fuels & Engines for Tomorrow's Energy-Efficient Vehicles.* Available at: http://www.nrel.gov/docs/fy16osti/66146.pdf

[10] *Id.*

A recent summary of DOE research conducted as part of the Co-optima program demonstrates that significant additional improvement in fuel economy and GHG emissions reduction can occur when advanced IC engines are paired with high octane low carbon (HOLC) fuels.[11] Automakers have also advocated for a coordinated approach to the development and regulation of engines and fuels. According to Dan Nicholson, vice president of global propulsion systems at GM, "Fuels and engines must be designed as a total system. It makes absolutely no sense to have fuel out of the mix."[12]

Pairing advanced IC engine technologies with high octane low carbon (HOLC) fuels would result in significant fuel economy and emissions benefits.

Numerous studies by the automotive industry, DOE, and academia have examined the efficiency gains and emissions reductions that can be achieved when HOLC fuels is used in an IC engine with HCR, turbocharging, and other advanced technologies examined by EPA as part of the midterm evaluation. These studies have repeatedly shown that high octane fuels (98-100 RON) used in HCR engines improve efficiency and reduces emissions by 4-10%, depending on drive cycle and other factors. Studies using a high octane mid-level ethanol blend also demonstrate that fuel economy and vehicle range using HOLC blends like E25 and E30 is equivalent or superior to performance using E10, even though the E25 and E30 blends have lower energy density.

Ethanol's unique properties make it an attractive candidate for boosting octane in future HOLC fuel blends.

Certain chemical properties, such as "sensitivity" and heat of vaporization, make some octane boosters more attractive than others. As researchers have examined different methods of boosting gasoline octane ratings, one option—increased levels of ethanol—has stood out as the most efficient and economical pathway.

Not only does ethanol offer extremely high octane (109 RON, 91 MON), it also features high sensitivity and high heat of vaporization. These are attractive properties that, when considered along with ethanol's lower "lifecycle" carbon intensity and lower cost relative to other octane options, make ethanol the clear choice for future HOLC fuels. The importance of octane sensitivity and heat of vaporization are discussed in great detail in the Ricardo report.[13] Ricardo states that these benefits are important considerations for "...DI engines especially, both NA and turbocharged, which are expected to comprise the majority of future engines for both conventional and hybrid vehicles."

In addition to the tailpipe CO_2 reductions observed in several of the studies cited in these comments, ethanol-based HOLC fuels also offer important lifecycle GHG emissions benefits. That is, the total "well-to-wheels" (WTW) emissions associated with producing and using ethanol are significantly lower per unit of energy delivered than the emissions resulting from petroleum production and use. The latest analysis conducted by DOE's Argonne National Laboratory found that today's corn ethanol reduces GHG emissions by an average of 34-44% compared to petroleum, while emerging cellulosic ethanol technologies offer GHG reductions of 88-108%.[14] These benefits are compounded when the ethanol is used in a HOLC fuel that achieves greater

---

[11] Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study.* ORNL/TM-2016/42

[12] Society of Automotive Engineers. Aug. 3, 2016. *GM, Honda execs agree: Higher octane gas needed to optimize ICE efficiency.* http://articles.sae.org/14940/

[13] *The Draft Technical Assessment Report: Implications for High Octane, Mid-Level Ethanol Blends.* Ricardo, Inc. September 20, 2016. Project Number C013713

[14] Wang, M.; Han, J.; Dunn, J. B.; Cai, H.; Elgowainy, A. Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use. Environ. Res. Lett. 2012, 7, 1−13, DOI: 10.1088/1748-9326/7/4/045905

fuel economy and vehicle range (i.e., more miles with less energy) than today's marketplace fuels.

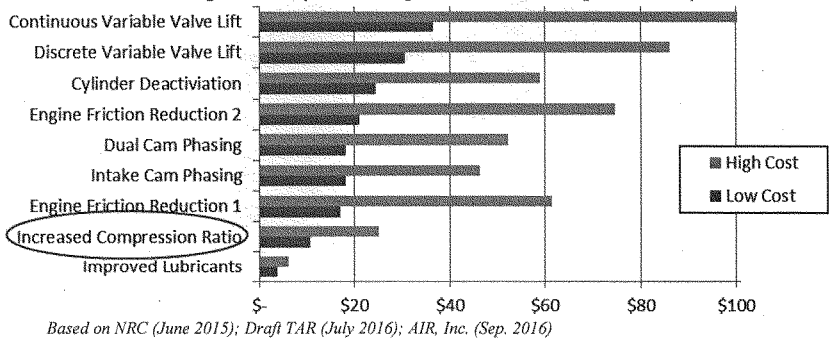
In a recent study, Argonne National Laboratory examined the WTW GHG emissions impacts of HOLC fuels (100 RON) containing 25% and 40% ethanol.[15] The analysis found that the inherent efficiencies resulting from using a high-octane fuel in a HCR engine alone resulted in a 4-8% reduction in GHG emissions per mile compared to baseline E10 gasoline vehicles. Additional GHG reductions of 4-9% were realized as a result of corn ethanol's lower lifecycle emissions upstream, meaning total GHG emissions per mile were 8% and 17% lower for E25 and E40, respectively, compared to baseline E10. Meanwhile, E25 and E40 HOLC blends made with cellulosic ethanol were shown to reduce total WTW GHG emissions by 16-31% per mile compared to E10. While high octane fuels using petroleum-derived octane sources may provide similar tailpipe CO_2 reductions as ethanol-based HOLC fuels, they clearly do not offer the additional GHG reductions associated with ethanol's full WTW lifecycle.

Additional studies show that using ethanol as the source of octane in future high-octane fuels has the potential to significantly decrease petroleum refinery GHG emissions by reducing the energy intensity of the refining process.[16]

Use of an ethanol-based HOLC in optimized IC engines would be the lowest cost means of achieving compliance with CAFE and GHG standards for MY2022-2025 and beyond.

When only the costs of various engine technologies are considered, HCR stands out as one of the most cost-effective means available for increasing engine efficiency (Figure 1).

Figure 1. Cost per Percentage Point Increase in Engine Efficiency



Based on NRC (June 2015); Draft TAR (July 2016); AIR, Inc. (Sep. 2016)

The NRC estimates that the cost to the automaker to introduce higher compression ratio for use with "higher octane regular fuel" is likely $75-150 per vehicle.[17] However, analysis by Air

[15] Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study.* ORNL/TM-2016/42

[16] See "Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content", DS Hirshfeld, JA Kolb, JE Anderson, W Studzinski, and J Frusti. (2014) dx.doi.org/10.1021/es5021668 | Environ. Sci. Technol. 2014, 48, 11064-11071; and "Petroleum refinery greenhouse gas emission variation related to higher ethanol blends at different gasoline octane rating and pool volume levels", V Kwasniewski, J Blieszner, and R Nelson, DOI: 10.1002/bbb.1612; Biofuels, Bioprod. Bioref (2015)

[17] NRC. June 2015. TABLE S.2 NRC Committee's Estimated 2025 MY Direct Manufacturing Costs of Technologies

Improvement Resource, Inc. suggests "...costs of increased compression ratio would be near zero, especially if it were accomplished during normal engine re-design cycles."[18] Similarly, Ricardo notes that "Since the costs to an OEM for increasing compression ratio are minimal for a new engine design, it is clear that implementing a high octane mid-level ethanol fuel standard would be the lowest cost technology and have even greater benefits in real world driving."

Still, the engine technology cost is only one-half of the equation when total vehicle purchase and operation costs are considered; fuel costs must also be considered. To examine the total cost of high compression ratio engines using a HOLC fuel (98 RON E25) as a technology pathway for compliance with 2022-2025 CAFE and GHG standards, Air Improvement Resource, Inc. (AIR) conducted a study that found this pathway can substantially reduce the cost of compliance with the standards, concluding that "With higher compression ratio engines included, total costs of the 2025 model year standards are reduced from $23.4 billion to $16.8 billion. ...This analysis has shown that if a high octane mid-level blend ethanol fuel such as 98-RON E25 were an option for model year 2022-2025 vehicles meeting EPA's GHG standards, overall program costs would be significantly reduced."

Increasing octane should not come at the expense of air quality, carbon emissions, or human health.

The potential for significant environmental, economic, and public health benefits from introducing higher octane fuels is obvious. However, the transition to higher octane fuels must be accompanied by requirements that octane sources improve air quality, reduce carbon emissions, and protect public health. Without such protections, there is the potential that increasing gasoline octane could result in unnecessary backsliding on criteria air pollutants, air toxics, and other harmful emissions linked to certain high-octane hydrocarbons. When it comes to air quality and human health, not all octane sources are created equal. Ethanol reduces criteria pollutants, and is the only source of octane that is truly renewable and results in a significant reduction in carbon. But much of the octane contribution in today's gasoline comes from petroleum-derived aromatic hydrocarbons such as benzene, toluene, and the C8 aromatics like xylene. Those sources of octane are far from benign.

The health impacts of aromatic hydrocarbons are well known. A 2015 study published in the *American Journal of Epidemiology* linked benzene found in traffic emissions to childhood leukemia. A 2012 study published by the University of California ties the risk of autism to toxics found in traffic pollution. And a 2015 study published in the *Journal of Environmental Health Perspectives* links microscopic toxic particles in car exhaust to heart disease. Aromatic hydrocarbons compose 20-50% of the non-methane hydrocarbons in urban air and are considered to be one of the major precursors to urban secondary organic aerosols (SOA). SOA is a form of fine particulate matter pollution (PM2.5), which is widely viewed as the most lethal air pollutant in the U.S. today. Moreover, new evidence is confirming that particulate matter from gasoline exhaust is a major source of black carbon, which is thought to be a significant contributor to climate change.

To date, EPA has been relatively quiet on the growing health and environmental threat posed by increased aromatics in gasoline. Because increasingly stringent fuel economy and GHG standards will likely result in increased use of higher octane fuels, the EPA must take into consideration the ancillary health and climate impacts of the various octane sources, and assure that no backsliding can occur.

---

[18] *Evaluation of Costs of EPA's 2022-2025 GHG Standards With High Octane Fuels and Optimized High Efficiency Engines.* AIR, Inc. September 16, 2016

Automotive engineers and executives, DOE researchers, the National Research Council, and academia all are calling for HOLC fuels to increase fuel economy and decrease GHG emissions.

Over the past several years, a growing chorus of automotive engineers and executives, government scientists, expert panels, and university researchers has called for the introduction of HOLC fuels. These experts have clearly demonstrated that HOLC fuels would enable HCR engines and other advanced IC engine technologies, which in turn would improve engine efficiency and reduce emissions. Below is a partial list of statements from these experts regarding the need for HOLC fuels.

- "Higher octane is necessary for better engine efficiency. It is a proven low-cost enabler to lower CO2; 100 RON fuel is the right fuel for the 2020-2025 timeframe."—*Dan Nicholson, vice president of global propulsion systems, GM*[19]
- "100 RON has been on the table for a long time. The only way we will ever get there is to continue to push and work in a collaborative way." – *Tony Ockelford, director of product and business strategy for powertrain operations, Ford Motor Company*[20]
- "We need to find a new equilibrium. Whether it is 98 or 100 (RON) octane, we need something at that level."— *Bob Lee, head of powertrain coordination, Fiat Chrysler*[21]
- "...it appears that substantial societal benefits may be associated with capitalizing on the inherent high octane rating of ethanol in future higher octane number ethanol-gasoline blends." – *Ford Motor Company*[22]
- "...a mid-level ethanol-gasoline blend (greater than E20 and less than E40) appears to be attractive as a long-term future fuel for automotive engines in the U.S." – *AVL Powertrain Engineering and Ford Motor Company*[23]
- "There has been a big push in the industry for higher octane ratings...and it is proven that you can gain several percentage points in improvement of fuel economy if you have higher octane rating fuel available." – *Dean Tomazic, executive vice president and chief technology officer, FEV North America*[24]
- "One of the advantages without costing more on the vehicle side is to look at upping the minimum octane rating on the fuel and allowing OEMs to optimize compression ratio in engines, which would give us an efficiency benefit without actually adding cost to the whole system. ...the addition of ethanol blends would be a good improvement to actually drive efficiency." – *David McShane, vice president of business development, Ricardo, Inc.*[25]

---

[19] Truett, Richard. Automotive News. April 13, 2016. *Powertrain executives press for higher octane gasoline to help meet mpg, CO2 rules.*
[20] *Id.*
[21] *Id.*
[22] J.E. Anderson et al. July 2012. *High octane number ethanol–gasoline blends: Quantifying the potential benefits in the United States.* Fuel, Volume 97: Pages 585–594.
[23] Stein, R., Anderson, J., and Wallington, T., "An Overview of the Effects of Ethanol-Gasoline Blends on SI Engine Performance, Fuel Efficiency, and Emissions," *SAE Int. J. Engines* 6(1):470-487, 2013, doi:10.4271/2013-01-1635.
[24] Detroit Public Television. Aug. 21, 2016. *Autoline with John McElroy.* Episode #2026 ("Deep Freeze for the ICE?")
[25] *Id.*

- "If we could optimize engines only to operate on premium fuel, then life would be a lot easier for us and we'd be able to see much more of a benefit in terms of efficiency. …if ethanol was widely available then our life as developers of gasoline engines would become easier." – *Paul Whitaker, powertrain & technical director, AVL Powertrain Engineering*[26]
- "(High octane fuels), specifically mid-level ethanol blends (E25-E40), could offer significant benefits for the United States. These benefits include an improvement in vehicle fuel efficiency in vehicles designed and dedicated to use the increased octane." – *Oak Ridge National Laboratory, Argonne National Laboratory, and National Renewable Energy Laboratory*[27]
- "Improvements to engine efficiency made possible with ethanol fuels may be a synergistic approach to simultaneous compliance with CAFE and RFS II. This presents a unique and infrequent opportunity to dramatically alter internal combustion engine operation by improving fuel properties." – *Oak Ridge National Laboratory*[28]
- "Several technologies beyond those considered by EPA and NHTSA (National Highway Traffic Safety Administration) might provide additional fuel consumption reductions for spark ignition engines or provide alternative approaches at possibly lower costs for achieving reductions in fuel consumption by 2025. These technologies include…higher compression ratio with higher octane regular grade gasoline…" – *National Research Council*[29]
- "[T]ransitioning the fleet to higher-octane gasoline would result in significant economic and environmental benefits through reduced gasoline consumption." – *Massachusetts Institute of Technology*[30]

As they begin a new rulemaking to revise 2022-2025 CAFE/GHG standards, EPA and NHTSA should "heed the call" for HOLC fuels.

EPA and NHTSA should use the new rulemaking process to establish the roadmap to broad commercial introduction of HOLC fuels in advanced IC engines beginning in 2023 or sooner. Consensus is building around the need for HOLC fuels to enable greater engine efficiency and reduced emissions. Automotive engineers and executives, government scientists, expert panels, and university researchers have called for a higher minimum octane rating for future fuels. These experts have clearly demonstrated that HOLC fuels would enable HCR engines and other advanced IC engine technologies, which in turn would improve engine efficiency and reduce emissions.

However, without regulatory intervention or guidance, there is no guarantee that HOLC fuels will indeed be broadly available in the marketplace to enable advanced IC engine technologies to proliferate. Many of the stakeholders calling for the introduction of HOLC fuels have also called upon EPA to use its regulatory authority to establish a minimum octane rating for future gasoline. The Alliance of Automobile Manufacturers made such a request during the Tier 3 rulemaking.

---

[26] *Id.*

[27] Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study.* ORNL/TM-2016/42.

[28] Derek A. Splitter and James P. Szybist (2014) "Experimental Investigation of Spark-Ignited Combustion with High-Octane Biofuels and EGR. 2. Fuel and EGR Effects on Knock-Limited Load and Speed" *Energy & Fuels.*

[29] NRC. June 2015, at 2-84.

[30] R.L. Speth et al. Economic and environmental benefits of higher-octane gasoline. *Environ Sci Technol.* 2014 Jun 17;48(12):6561-8. doi: 10.1021/es405557p

Meanwhile, the NRC recommended that "EPA and NHTSA should investigate the overall well-to-wheels CAFE and GHG effectiveness of increasing the minimum octane level and, if it is effective, *determine how to implement an increase in the minimum octane level* so that manufacturers would broadly offer engines with significantly increased compression ratios for further reductions in fuel consumption."[31] Similarly, the attached Ricardo report states, "It is clear that implementing a high octane fuel standard would provide opportunity for increased engine efficiency and hence reduced greenhouse gases."

EPA clearly has the authority to regulate gasoline octane ratings, as octane has direct implications for emissions of CO_2 and other pollutants. EPA has acknowledged this authority, stating that "CAA 211(c) provides EPA with broad and general authority to regulate fuels and fuel additives; this authority could be used to…'control'…the octane level of gasoline."[32] While EPA has acknowledged it has the authority to regulate octane levels, the agency has suggested that the "time frame to complete all the steps [to implement octane regulations] could be ~10 years" and that "[e]ven if the rule were initiated now it would likely be a number of years before it could be implemented."[33] Chris Grundler, director of EPA's office of transportation and air quality, recently confirmed that EPA is not likely to consider regulating gasoline octane levels before 2025.[34]

Although RFA believes adoption of new regulations governing octane levels could be done relatively quickly (certainly more quickly than 10 years), EPA maintains that an extremely long lead time is required. Similarly, automakers would require a long planning horizon to adjust engineering and design activities in response to impending changes to fuel composition. Given the long lead time involved in effectuating changes to EPA regulations and automaker engineering and design plans, the agencies should indicate *now* the future direction of potential octane regulation and HOLC fuel introduction. That is, EPA and NHTSA should use the new rulemaking process as an opportunity to respond to stakeholder outcry for HOLC fuels, including a regulatory roadmap that the agencies, automakers and other stakeholders can follow to guarantee gasoline in 2025 and beyond has the necessary minimum octane rating to enable proliferation of advanced IC engine technologies that improve fuel efficiency and slash GHG emissions.

Thank you for the opportunity to comment and I look forward to working with you to find opportunities for high octane fuels.

Sincerely,

[redacted]

Bob Dinneen
President & CEO

---

[31] NRC. June 2015, at 2-86.
[32] P. Machiele, EPA. May 5, 2015. "EPA's Regulatory Authority to Address Octane." Presentation to EPA Mobile Sources Technical Review Subcommittee.
[33] *Id.*
[34] Society of Automotive Engineers. Aug. 3, 2016. *GM, Honda execs agree: Higher octane gas needed to optimize ICE efficiency.* http://articles.sae.org/14940/

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225–2927
Minority (202) 225–3641

May 1, 2018

Mr. Dan Nicholson
Vice President, Global Propulsion Systems
General Motors
800 N. Glenwood Avenue
Pontiac, MI 48340

Dear Mr. Nicholson:

Thank you for appearing before the Subcommittee on Environment on April 13, 2018, to testify at the hearing entitled "High Octane Fuels and High Efficiency Vehicles: Challenges and Opportunities."

During the hearing, Members asked you to provide additional information for the record, which are attached. To facilitate the printing of the hearing record, please provide your response with a transmittal letter by the close of business on Tuesday, May 15, 2018. Your response should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

USCAR Ethanol Volume Scenarios for 95 RON High Octane Fuel

May 2018

Background and Assumptions

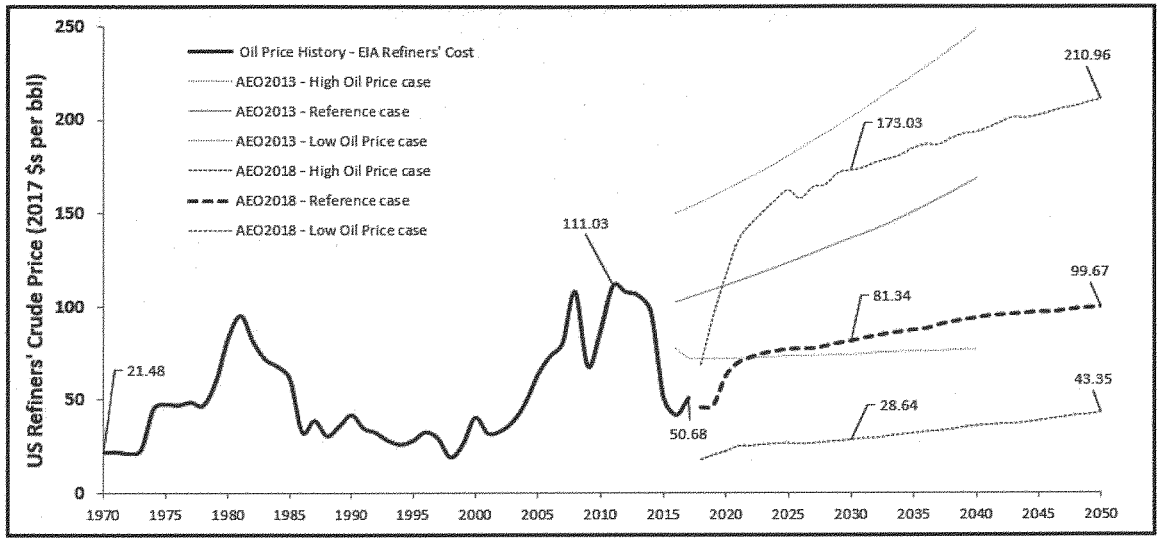
Background

- A model was constructed within the USCAR Fuels Working Group to quantify US ethanol use in gasoline, under various scenarios, as regular gasoline transitions to 95 RON high octane fuel (HOF) from CY22 (vehicle MY23)
- Model scenarios are based on EIA Annual Energy Outlook 2018 oil price cases and data sets, a pace of fuel pool transition derived from Argonne National Lab's VISION model, and assumptions around US gasoline grades, market shares, and ethanol volume percentages

Model Assumptions

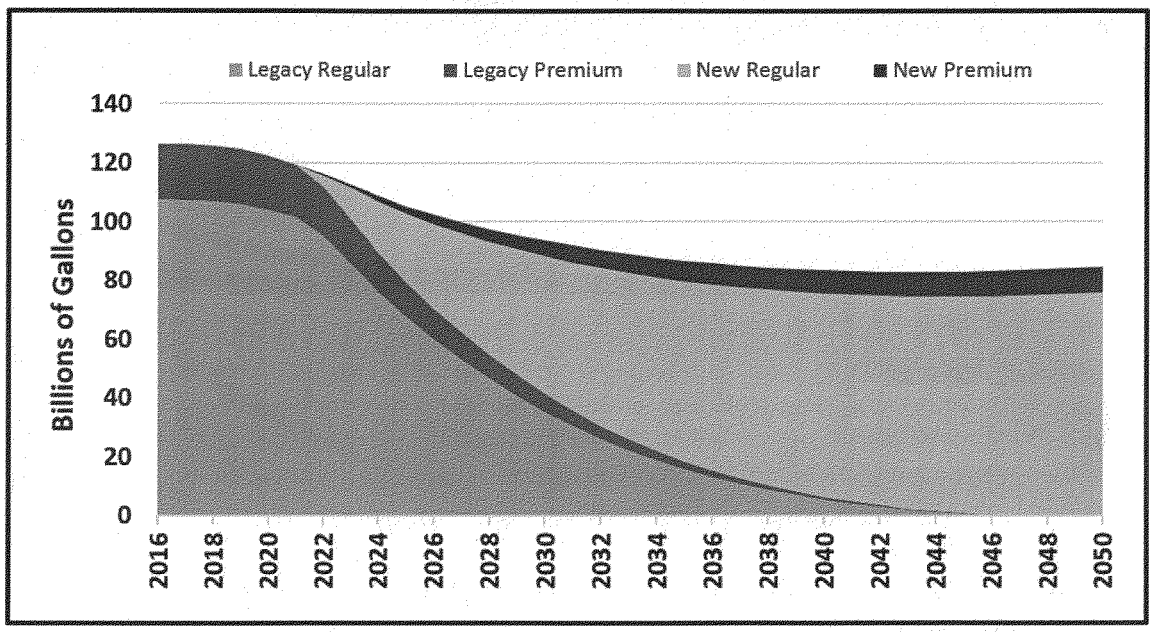
- Legacy fuel remains at E10 (ethanol volume set to 10.1% to calibrate with 2017 actual ethanol use, including blender pump / E85 volumes, of 14.5 B gallons)
- E85 volumes from EIA are not modeled explicitly. Assumed that these volumes will largely be absorbed into 95 RON HOF for octane value
- Exceptions not made for California – assumed CA will follow rest of country in any shift toward E15 or higher (understanding work is required to enable this)
- 98 RON new premium grade is included in the model, but ethanol blend volume of this grade follows 95 RON HOF in current scenarios
- Non-light duty vehicle gasoline is assumed to follow light duty in octane and ethanol blend volume (for Ref case for 2017, 88% of US gasoline is used by light duty vehicles)
- EIA oil price projections are illustrated on the following slide

EIA Oil Price Projections



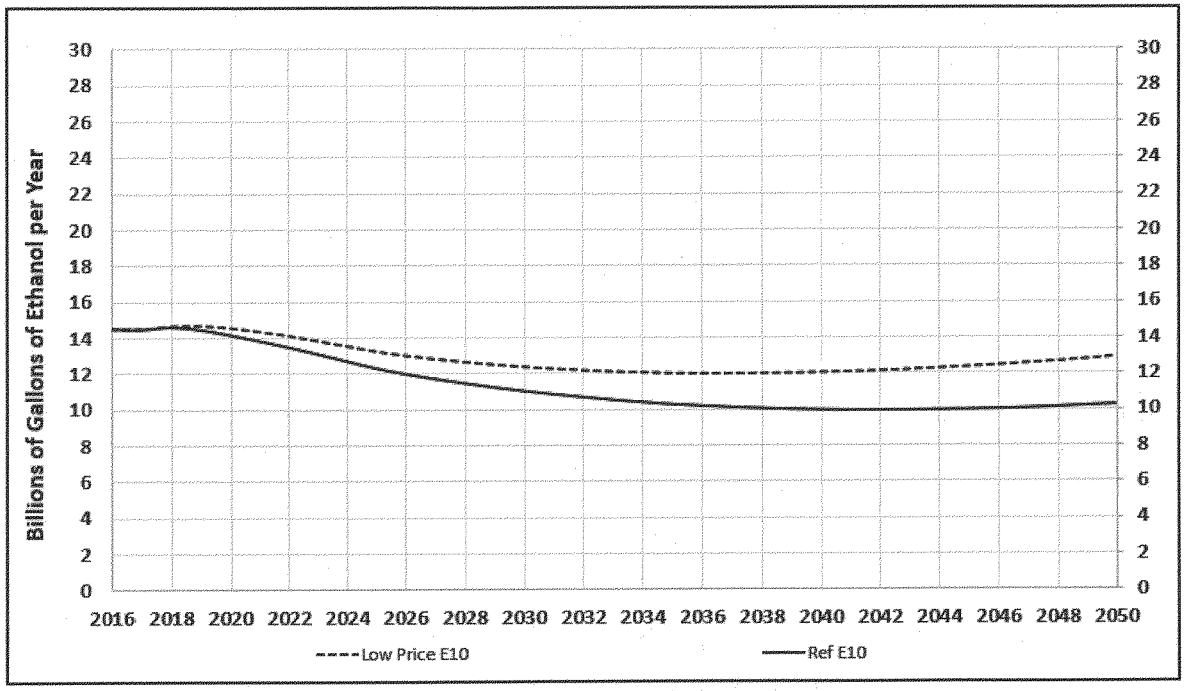
- The three oil price cases modeled (High Oil Price, Reference, and Low Oil Price) cover a broad range and comprehend most probable futures
- 2013 projections included for comparison. EIA's oil price projections have trended downward over time as new oil resources, particularly those unlocked by new U.S. production technologies, have moved into the market
- A sustained High Oil Price case is deemed unlikely. Therefore, this case has been excluded from the following analysis

Reference Case: US Light Duty Gasoline Pool Projection



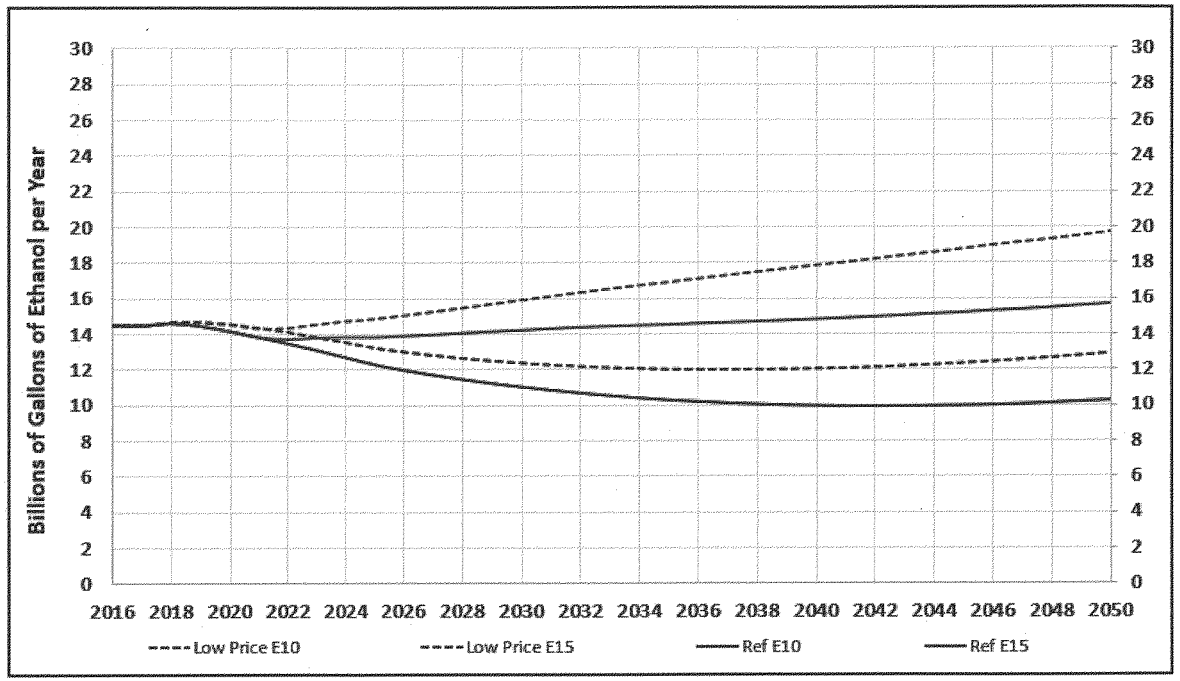
- The overall fuel pool shrinks as efficiency gains more than offset growth in miles traveled
- The fuel pool transition outpaces the fleet transition, as new vehicles are driven more miles each year than older vehicles
- Assuming a transition start date of 2022, half of U.S. fuel will be high octane in 7 years (2029), and 80% will be high octane in 13 years (2035)

Ethanol Volume Projections for E10 HOF Case



- At E10 blend levels, ethanol volumes decline to a range of 10~12B gallons/year over the two EIA oil price cases modeled

Ethanol Volume Projections for E10 and E15 HOF Cases



- Assuming blend levels land between E10 and E15 as demand for octane grows, ethanol volumes might be expected to hold at 14-16 billion gallons per year, even as the broader fuel pool shrinks by 20-30%

Data Sources

Fuel Volumes

US fuel volumes over time were taken from EIA's Annual Energy Outlook 2018 Reference, Low Oil Price, and High Oil Price cases. Key tables used were

Table 2 - Energy Consumption by Sector and Source

Table 37 - Transportation Sector Energy Use by Fuel Type Within Mode

https://www.eia.gov/outlooks/aeo/

Fuel Pool Transition Rate

US light duty vehicle fuel pool transition rates were based on Argonne National Laboratory's VISION model, which provides projections of sales volumes, new vehicle fuel economy, vehicle miles traveled by age, and rate of attrition of older vehicles out of the national fleet

https://www.anl.gov/energy-systems/project/vision-model

Fuel Energy to Volume Conversions

Values used in converting EIA's energy units (Btu's) to physical gallons of fuel were taken from Argonne National Laboratory's GREET model

https://greet.es.anl.gov/